United States Coast Guard

Systems Times

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U.S. Coast Guard Systems Times

Working Today to Challenge Tomorrow

U. S. Coast Guard Systems Times

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Article and Photo Submissions:

Articles should be about 500 words long; however, C4 and engineering specific articles can be up to 2,000 words. To have your article considered for publication, photo(s) must accompany each article. Articles can be submitted by FedEx in hard copy and/or in Microsoft Word on a 3.5 disk or e-mailed electronically. Please submit original photographs and graphics. All slides, photos, graphics and illustrations should be in color where possible. Let us know if you want your photos and graphics returned to you. Submit inquiries, letters, articles, and photographs to:

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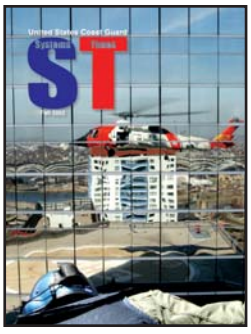

Cover: Rick Gallant of Coast Guard Air Station Cape Cod inspects the helicopter landing pad at Mass General Hospital during a practice drill April 12 in Boston, Mass. USCG photo by PA2 Tom Sperduto.

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Editor's Note:

Haven't seen your article yet? Please bear with us as we plan to publish them all. In our call for Civil Engineering articles for the Summer 2003 issue, *Focus on Facilities*, we received over 50 articles of various lengths and numerous images. This number does not include the various other engineering and C4 submitted articles not relating to Civil Engineering.

Our goal is to publish them all, but this will take time due to space and page constraints. We know the time and effort you put in to preparing your article and we fully intend to publish each and every-one as soon as we can. If you have any questions or concerns, please do not hesitate to contact us.

However, please keep those articles coming in, sooner or later, we are going to exhaust the backlog and we will need to keep the article pipeline flowing. Thank you!

From the Chief Engineer

Greetings,

And welcome to the Fall 2003 issue of *Systems Times*. I am truly excited about the opportunity to serve as your Chief Engineer. I reported on board on 2 July, and look forward to continuing the Systems' outstanding legacy of excellence. I first and foremost want to express my sincere appreciation and thanks to Rear Admiral James A. Kinghorn, my immediate predecessor, who retired in June after 36 years of distinguished service, for his passion, compelling vision and stellar leadership to our Service and to our great nation.

Clearly our individual and collective organizational purpose is to accomplish our Coast Guard missions. We in Systems must continue to be engaged, proactive and responsive to create and sustain this organizational success. The Commandant has clearly articulated the elements that provide organizational success are **People**, **Readiness**, and

From the Chief Engineer

Stewardship. I believe that their most important core elements for us within Systems are *Intellect* (People), *Infrastructure* (Readiness) *and Information* (Stewardship). Accordingly, I will focus my energies on these elements. I believe very strongly that we must invest in the intellectual growth of our people, we must build on the knowledge base and experience of those who have gone before, and we must develop, deploy and maintain the cutters, boats, aircraft, shore facilities, C4ISR and system infrastructure critical to ensure the Coast Guard successfully accomplishes its missions. As the new Assistant Commandant for Systems, I ask you to continue creating the successes our Coast Guard has enjoyed for over 213 years.

Times of challenge and change lie ahead. In 1996, Rear Admiral Ed Barrett stood up the Systems Directorate merging the former offices of Engineering and Telecommunications. Today, as we face new challenges, including transitioning to the Department of Homeland Security, an era of new normalcy and technological advancements, we again are on the verge of change and reorganization. The reorganization, which would be transparent to many field units, is expected to be completed within the next few months. Details of the new organization will be published in the Winter edition of *Systems Times*. The new organization provides more effective and efficient support to our Coast Guard operations. While it's human nature to resist change, change is often necessary to remain current; to remain relevant. To effectively execute our responsibilities, we must change.

While truly challenging times lie ahead, I am confident that *together* we can master any challenge! Thank you for your service to our Coast Guard and to our nation.

Erroll M. Brown RADM, USCG
Assistant Commandant for Systems
"Chief Engineer"

Bad Batch of Aluminum Results in the Replacement of Icebreaking Fleets New ASB and LCVP Hulls (NESU Seattle)

Soon after reporting in the Spring 2002 edition of the *Systems Time* about the new Landing Craft Vehicle Personnel (LCVP) and Arctic Survey Boat (ASB) that replaced the old Higgins boats, it was discovered that severe pitting was occurring on the new aluminum hulls. After many attempts to slow the process, and get a handle on the situation, it was apparent that something else was wrong. There were reports that the aluminum manufacturing company that supplied the 5083 aluminum for the four LCVPs and ASB had been getting complaints from many northwest boat builders that the aluminum was pitting at an alarming rate. Some of the LCVP's had pinhole pitting of half thickness in the ¼ inch hull plate after only six months of service. The cause was found to be in the process of how the aluminum was blended with the magnesium to make the alloy. Somehow the magnesium did not blend evenly throughout the plate and left small pools of magnesium that corroded severely in a seawater environment causing the pitting.

After the wide spread aluminum problem was discovered and the source found, Coast Guard legal teams worked with the supplier and manufacturer to hammer out a solution. The aluminum supplier came forward and agreed to replace the boat hulls and house due to a latent defect claim by the government at no cost to the Coast Guard. Over 150 boats nation wide were built with this same type of aluminum and have the same types of problems.

Naval Engineering Support Unit (NESU) Seattle was put in-charge of ensuring that the Icebreakers' boats were taken out of service in order of worst to still usable to ensure that the Icebreakers had an LCVP to take with them on their missions while the rebuilding of the new boats was taking place. The manufacturer was paid by the aluminum supplier to take all of the machinery and electronics out of the boats, build new hulls and cabins, and replace the equipment back into the new hulls and test after they were built.

Seeing a once in a lifetime chance to improve the boats, NESU Seattle asked for input from POLAR SEA, POLAR STAR, and HEALY on any improvements from an operator's standpoint that could be made to the boats before they were rebuilt. Like all good Boatswain's Mates (BMs) or Machinery Technicians (MKs) they had plenty. Ensuring that the changes would have no effect legally on the warranty contract or delaying the boats delivery dates, NESU worked with the Maintenance and Logistics Command Pacific's Naval Engineering Division (MLCP(v)) to fund these changes. The main improvements made to the four LCVPs were to enlarge the cabin from 60" x 78" to 84" x 78". This moved the helm midships, added a third front window, and allows up to eight crew members to ride in the cabin vice four. An additional door was added to the port side, and a sliding window on the aft bulkhead to improve communications to the deck personnel, and to give crew members three routes for egress out of the cabin in an emergency instead of just one. These changes were made along with some smaller changes; adding additional hull 3-inch "D" rubber fenders down the hull for protection while raising and lowering the boats, 3-inch pipe davit with 12volt witch for assisting divers and their gear, splitting the aft railing to allow for towing without bending the railing, enlarging the deck cleats to 12 inches vice 10 inches to allow for more

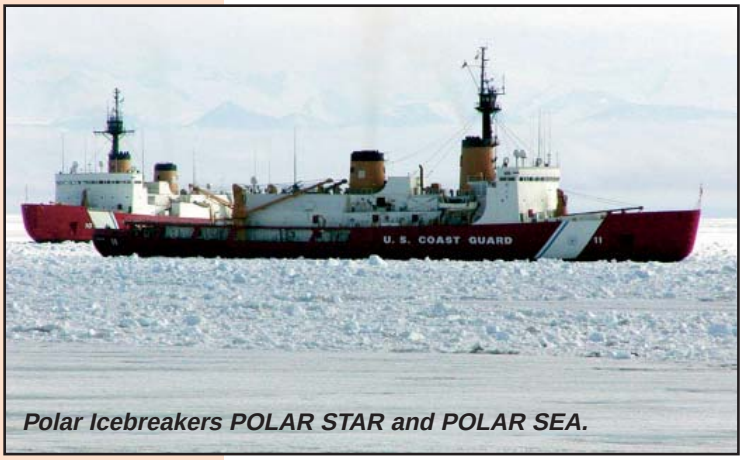
line on the cleat, and installing Furuno 1622 radars to standardize the LCVP's electronics with the ASB. The only changes that the ASB received was the split aft safety railing for towing, and upgraded deck cleats to 12 inches.

These improvements were made at an additional total cost of $35,000 for all five boats, a relative bargain for the additional safety of the crews and operational improvements.

The first replacement LCVP was delivered to NESU Seattle on 10 October 2002, and the final LCVP was accepted on 30 January 2003.

Polar Class Icebreakers 750KW ALCO 8-251 Series Gensets (NESU Seattle)

For years, the Polar Class Icebreakers have been plagued with an overheating problem with the 750KW ALCO 8-251 series Gensets. In the colder waters of the Pacific Northwest, the gensets could only produce approx. 650kw before reaching the maximum allowable jacket water temps. In the equatorial regions the gensets could only produce approx. 450KW, requiring three genset ops. Several potential problems were examined with only limited success.



Polar Icebreakers POLAR STAR and POLAR SEA.

The original Robert Shaw Temperature Regulating Valves (TRV) were replaced at one point with AMOT style TRVs equipped with a bypass. The replacement style TRV had a slightly lower full flow rating then the original, so the original valves were reinstalled with no significant change in the overheating condition.

The engines state of tune, and condition of the existing coolers were examined and corrected, again with no significant change.

The U.S. Navy Fleet Technical Support Center Atlantic (FTSCLANT) was then called in to examine the situation. After extensive research, they found that the existing salt water/jacket water heat exchangers were undersized for the application. This condition was traced back to the construction of the vessels when the specifications for the cooler were submitted to the cooler manufacturer from the engine manufacturer. The heat load calculations failed to include the heat load for the lube oil in the system. The cooler manufacturer assumed the lube oil was cooled by salt water instead of the actual arrangement where the lube oil is cooled by the jacket water. The existing coolers were only rated for the heat load of the jacket water and the generator air cooler and should have also included the heat load to be removed from the lube oil system.

The following formulas explains the difference in BTUs per hour:

- 25 (total jacket water and air cooler heat factor) x 1050 (rated HP) x 60 (minutes) = 1,575,000 (hourly heat load in BTU).
- 31 (total lube oil, jacket water, and air cooler heat factor) x 1050 (rated HP) x 60 (minutes) = 1,953,000 (hourly heat load in BTU).

As you can see, failing to include the L/O heat load resulted in an undersized cooler incapable of handling the additional 378,000 BTUs present.

Now that the problem has been identified, efforts are underway to procure and install 2,000,000 BTU coolers for all six of the Polar gensets.

ALCO 251 Series Turbocharger Upgrade (NESU Seattle)

A joint effort with the Engineering Logistics Center (ELC), the Maintenance and Logistics Commands Pacific and Atlantic (MLCLANT & MLCPAC), and the Navel Engineering Support Unit (NESU) Seattle is currently underway to replace the antiquated Globe turbochargers on the Polar Class (WAGB) ALCO 8 and 16 cylinder 251E, and 210 Medium Endurance Cutter (WMEC) 16 cylinder 251B series engines with a more modern cartridge style turbocharger.

The process started with an Engineering Change Request (ECR) submission from NESU Seattle to prototype a new generation cartridge-style turbocharger on one of the Polar Class WAGB Ship Service Generators and Main Diesel Engines. The installation was completed in October 2002, followed by extensive testing on the engines before and after the turbo installation. Since the NESU has Load Banks for the Polar WAGBs, all the under load testing could be completed at the pier. Additional testing was completed during the vessel's transit from Honolulu, Hawaii to Sydney, Australia during Deep Freeze 03. The testing included a signature analysis of the performance, fuel consumption monitoring, and emissions testing of exhaust gases. The results indicated a 25% increase in performance, a 7% decrease in fuel consumption, and a 65% decrease in opacity discharges. Although a sufficient amount of operating hours have not been experienced, we expect to see a significant increase in the amount of time between failures, as well as a reduction of approximately 75% in maintenance hours due to the cartridge style design.

Based on these extremely favorable test results, an open competition is being contemplated for purchase of cartridge-style turbochargers for all six of the Polar WAGB 8 cylinder 251E Ship Service Generators using available Polar WAGB Reliability and Improvement Project (RIP) funding. Source selection will involve evaluating a combination of price and technical factors, the latter of which may include (although not yet a finalized list): past performance (i.e., previous installations in a marine application); engine performance (i.e., documented gains in similar installations); available service support network; proposed installation method (i.e., extent of modifications required to mount new style turbo); and offered commercial warranty. When the solicitation period is complete, a technical evaluation team will be formed consisting of representatives from ELC, MLCLANT, MLCPAC, and NESU Seattle to determine the best turbocharger for the application.

This specification and selection process will also be used by the ELC to purchase replacement turbochargers for the 16 cylinder 251E and B series engines as funding becomes available.

Nationwide/Maritime Differential Global Positioning System (N/DGPS) (C2CEN)

The Nationwide Differential GPS (N/DGPS) expansion project continues to increase signal coverage throughout the United States. Twenty-six N/DGPS sites are now on air supplementing the existing Maritime DGPS sites for a total of 85 transmitting broadcast sites. Recently, the U.S. Air Force Ground Wave Emergency Network (GWEN) sites at Hackleburg, Alabama and Kensington, South Carolina were converted to N/DGPS operations. New maritime DGPS sites were constructed in Pahoa, Hawaii and Angleton, Texas. The Kensington site replaces the Charleston, South Carolina maritime DGPS site and the Angleton site replaces the Galveston, Texas maritime DGPS site. The upcoming months will show the same steady progress, as additional sites will be brought on-air. These sites include a new construc-

tion site in Greensboro, North Carolina and GWEN conversions at Lincoln, California; Bakersfield, California; and Austin, Nevada. The Lincoln site will replace the Point Blunt, California maritime DGPS site.

USCG Command and Control Engineering Center (C2CEN) recently completed Field Change (FC) 16, which converts the wide area network services from an X.25 protocol to a Frame Relay protocol. FC 17, which standardizes the DGPS broadcast site monitor interfaces, has recently been issued.

C2CEN continues to improve the N/DGPS infrastructure with additional engineering projects including, but not limited to: fully inclusive MF radiator, ground, icing, and lightning protection studies to determine the ideal DGPS antenna configuration; development of a Remote Transmitter Control Interface (RTCI) for the N/DGPS GWEN transmitter to allow the Nationwide Control Station to interface directly; and a SC1000 battery charger upgrade.

Plans for system component recapitalization has started with engineering investigations on robust coupler designs, portable antenna solutions, and GPS/DGPS technology investigations. N/DGPS Point of Contact is Mr. Dave Wolfe at (757) 686-4015.

Tender Deployable DGPS System (CG/PSN-1) (C2CEN)

CG/PSN-1 systems are fielded aboard USCGC KUKUI in Hawaii, USCGC SPAR in Alaska, and USCGC SASSAFRAS in Guam. Feedback from the cutters is starting to flow. Most of it centers in three areas: 1) marginal performance of the VHF datalink, 2) failures of the notebook PCs, and 3) complexity of operation. The USCG Command and Control Engineering Center (C2CEN) is taking steps to address each of these issues. Engineers have identified and are testing improved VHF datalink hardware for the systems. The improved datalink hardware corrects several shortcomings in the currently installed VHF equipment including: lack of a key delay to allow transmitter attack time; poor performing forward error correction; replacement of the quirky graphical user interface software; and significantly higher VHF datalink power settings. Additionally, C2CEN is in the process of procuring and testing ruggedized, water-resistant notebook computers to prevent failures caused by exposure to salt air. C2CEN is in the process of improving the system's technical manual and documentation. Future plans include contracting a complete system groom that will include depot installation of these upgrades in each unit. The timeline for the groom/upgrade process is 9-12 months. Additional efforts include field support of the system, completion of the cutter navigation interfacing study, and development of a computer based training program. CG/PSN-1 Point of Contact is Mr. Ben Otteni at (757) 686-2175.

Vessel Traffic Service (VTS) (C2CEN)

The USCG Command and Control Engineering Center (C2CEN) supports the Vessel Traffic Services (VTS) located in New York, Houston/Galveston, San Francisco, and Puget Sound. Current efforts have focused on upgrading radar remote sites to a PC-based Radar Processor (PCRP). These upgrades were coupled with software upgrades to provide enhanced radar control, tracking, and tuning.

C2CEN is working closely with the Vessel Traffic Services Project Manager (G-AVT) and the Port and Waterways Safety System (PAWSS) contractor in planning for the transition to a replacement VTS system. A baseline PAWSS was installed at C2CEN in July. This installation facilitates engineering development for PCRP processors to accept input from a Terma based radar system. This will permit dual-system operations where the Terma generated radar picture is displayed on both the current VTS system and the new

PAWSS system, providing a transition period for operators to become familiar with the new system. Two ports are scheduled for transition to PAWSS in late 2004.

Other efforts include developing an Automatic Identification System (AIS) interface to provide precise tracking of vessels equipped with transponders. AIS is under development and is planned for field installation on west coast VTSs later this year. Additionally, closed circuit television camera installations and upgrades have been done at Norton's Point, New York and Berwick Bay, Louisiana, and are planned for Louisville, Kentucky. VTS Point of Contact LCDR Randy Navarro at (757) 686-4237.

Loran Support Unit Hotline (LSU)

The Loran Support Unit (LSU) operates a 24/7 hotline in support of all operational Loran units. In December, 2002, the LSU revamped its internal hotline procedures in an effort to maximize assistance provided, while minimizing the impact to ongoing LSU initiatives. The new system is based on dividing calls at their source to control the flow and impact of information. Units requiring immediate assistance in conjunction with a Casualty Report (CASREP) or emergency off air or out of tolerance condition call the LSU hotline number. During normal business hours, the call is answered by an Electronics Technician (ET) who collects basic casualty information. After hours units leave a voice-mail and the system automatically activates the Officer of the Day's (OOD) beeper, the OOD then contacts the unit. Following initial contact, causality response is dealt out to the appropriate LSU personnel based on a support personnel competency tree. The use of the competency tree ensures that the most qualified LSU personnel are assisting the unit. LSU operates on the 30/3 rule, 30 minutes to get in touch with the station to collect data and 3 hours to begin providing assistance. Station's routine questions or concerns, that do not require immediate assistance, are sent via e-mail to the LSU hotline e-mail address and are answered during the next business day.

An Access database, created in-house by ET1 David Nevers, was overlaid with the hotline system during the process restructuring. This database is used to track all hotline calls from initial contact through resolution. In addition to hotline calls, the database also tracks all CASREPs affecting the Loran system, System Trouble Reports, and System Improvement Requests. The database gives the LSU the capability to identify failure trends and keeps support personnel from duplicating efforts on repetitive casualties.

The new hotline process does not reduce the number of casualties in the field but, has resulted in an 80% reduction in the total man-hours needed to resolve casualties. More importantly, the system has seen a 90% reduction in rapid response man-hours that pull members away from current tasking. By sorting calls based on severity and using personnel more wisely, the LSU is now better able to perform all of its missions.

LSU's Point of Contact is LTJG Conover at (609) 523-7280.

Loran Support Unit Groom Initiative (LSU)

The Loran Support Unit (LSU) provides intermediate level support for the entire North American Loran-C system. In 2002, the LSU chose to shift from a reactive support model to a proactive intervention support approach. The focal point of the new philosophy is the stand-up of the Groom Program. The Groom Program consists of teams of specialized Loran technicians who optimize Loran equipment, provide targeted training on-sight, and assist with Configuration Management Plus (CMPLUS). Grooms are conducted at 24

Loran Stations (annually), two Control Stations (annually), and at 24 Primary Chain Monitor Sets (biennially).

The average team consists of approximately three technicians and a standard Loran Station Groom takes one week. The results of the Groom are documented in a report that is disseminated throughout the Loran command structure. As the old Tube-Type Transmitter Stations continue to age and become more difficult to maintain, Groom visits will help provide the capability to meet operational availability standards.

In the Automated Loran Station (ALS) of the future, the Groom Program will play a crucial role in Loran operations. LSU's Point of Contact is LT B. McMillan (609) 523-7209

The Coast Guard Yard - Protecting Homeland Security (Yard)

The JOHN H. GLENN, JR., a Washington, D.C. fireboat, is an essential homeland security asset to the our nation's capital. The faithful vessel fights fires, performs watches on the Potomac River, conducts search and rescue cases, and cuts ice during frigid D.C. winters. The photo pictures the fireboat undergoing a seven month major retrofit (new engines and new generators) at the Coast Guard Yard in the spring of 2003.

Yard Dedicates Newly Refurbished Engine Overhaul Facility (Yard)

The Yard dedicated its newly refurbished Engine Overhaul Facility (EOF) during ceremonies held in May 2003 in the former Boat Shop. The All-Hands special event hosted U.S. Senator Paul Sarbanes of Maryland and Congressman Benjamin Cardin of Maryland's Third Congressional District who cut the red ribbon to officially open the new EOF.

Senator Paul Sarbanes (center) and Congressman Ben Cardin (right) join Captain Ron Rábago, Yard Industrial Manager (left), to ceremoniously cut the red ribbon opening the newly refurbished Engine Overhaul Facility at the Yard. Also present for the ceremony was Cori Duggins, Constituent Liaison for Congressman Dutch Ruppersberger of Maryland's 2nd District.

The Engine Overhaul Facility provides 25,000 square feet of work space to accomplish the overhauls of British built Paxman engines, American built Caterpillar engines, and German built Motoren-und Turbinen-Union (MTU) engines. Paxman and Caterpillar engines are the main propulsion machinery for the 110' patrol boat fleet. MTU engines provide power for the 87' patrol boats. The EOF also includes a new dynamometer for testing rebuilt engine starters.

The facility offers areas for sandblasting, power wash degreasing, starter rebuilt/testing, and painting -- all housed under one roof. The EOF's design permits the separation of these industrial activities in order to maintain a clean and high quality operation.

The Shop will accommodate simultaneous overhauls of 12 engines with the potential to complete 30 engine overhauls annually. Work began in the new EOF in August and should be up to full capacity by December 2003.

Correction: In the Summer 2003 *Systems Times*, "Systems of Interest" section, page 7, Vessel Traffic System (VTS) should read Vessel Traffic Service (VTS).

Meet the Coast Guard's Chief Engineer, RADM Erroll Brown

A 1972 graduate of the U. S. Coast Guard Academy, Rear Admiral Brown majored in Marine Engineering. At the University of Michigan he earned a masters degree in Naval Architecture and Marine Engineering and a second masters in Industrial and Operations Engineering. A Masters of Business Administration degree was awarded to Rear Admiral Brown in 1986 from Rensselaer Polytechnic Institute. In 1994, he graduated from the Naval War College with a masters degree in National Security and Strategic Studies. RADM Brown has completed Harvard's John F. Kennedy School of Governmental Program for Senior Executives in National and International Security.

Rear Admiral Brown has served as Damage Control Assistant and Assistant Engineer Officer aboard the Coast Guard Icebreaker BURTON ISLAND (WAGB-283), and Small Boat Maintenance Type-Desk Officer, Eleventh Coast Guard District, Naval Engineering Branch. At Coast Guard Headquarters, he served in the Small Boat Branch as the supervisor for two resident inspection officers, overseeing their small boat construction projects. Rear Admiral Brown was assigned as Engineer Officer aboard the Coast Guard Cutter JARVIS (WHEC-725), was an instructor in the Marine Engineering Department at the U. S. Coast Guard Academy, and served as Executive Officer aboard Coast Guard Cutter RUSH (WHEC-723). A Program Reviewer in the Office of the Chief of Staff, Programs Division in Coast Guard Headquarters, he has also served as the Military Assistant to the Secretary of Transportation. Rear Admiral Brown was assigned as Chief, Budget Division, Office of the Chief of Staff in Coast Guard Headquarters. He served as Commanding Officer, USCG Integrated Support Command, Portsmouth, Virginia and as Commander, Maintenance and Logistics Command Atlantic, Norfolk, Virginia. Most recently he served as Commander, Thirteenth Coast Guard District, Commander, Maritime Defense Command Thirteen and Region Ten Emergency Transportation Coordinator.

A registered Professional Engineer (PE) in Virginia, Rear Admiral Brown co-authored a University of Michigan Text with Professor Harry Benford entitled *Ship Replacement and Prediction of Economic Life*. He presented this paper before the 25th Annual Colloquium of Shipbuilders at the University of Hamburg in Hamburg, Germany.

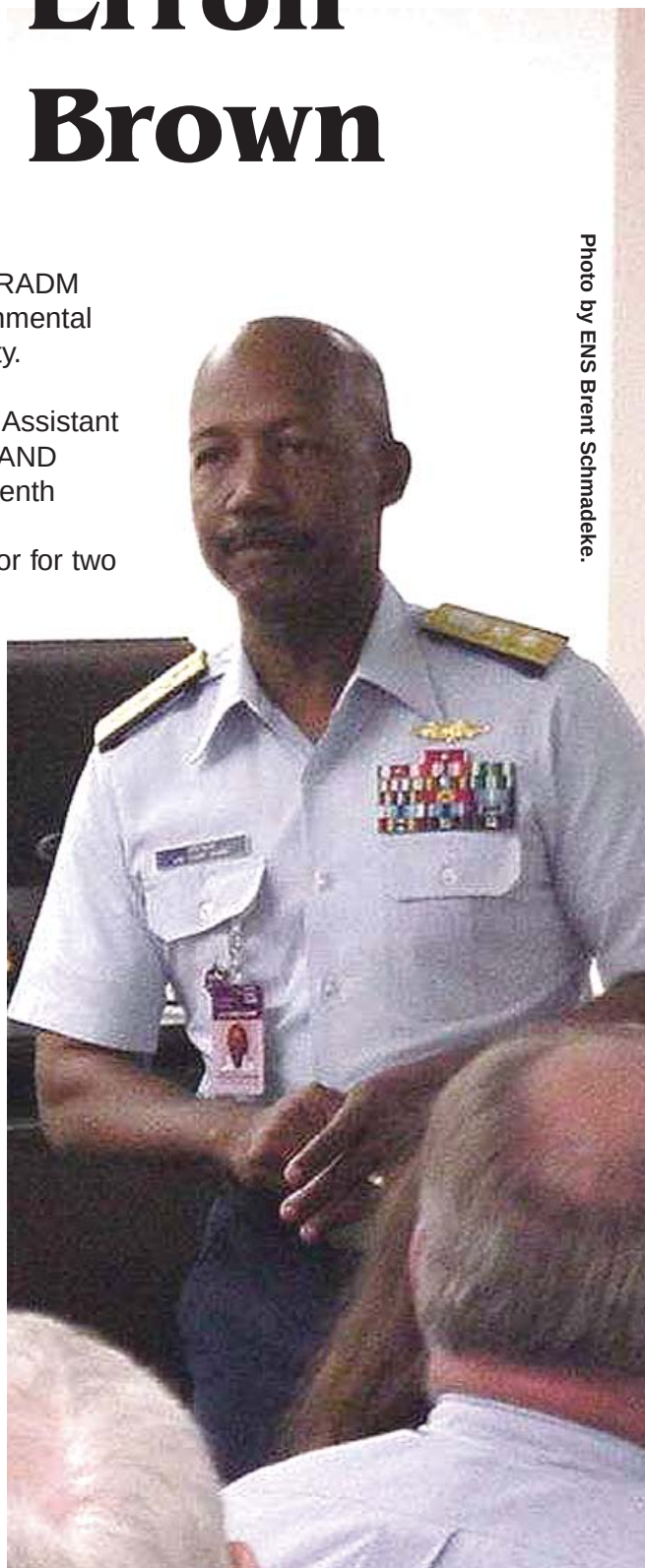


Photo by ENS Brent Schmadeke.

A long-standing active member of the American Society of Naval Engineers, Society of Naval Architects & Marine Engineers, and the American Society of Engineering Educators, Rear Admiral Brown has held offices at various organizational levels. He also serves as a Program Evaluator for the Accreditation Board for Engineering and Technology (ABET).

Rear Admiral Brown's awards include: Legion of Merit (2 awards), Meritorious Service Medal (2 awards), Secretary's Award for Meritorious Achievement, U. S. Coast Guard Commendation Medal (2 Awards), Unit Commendation, Meritorious Unit Commendation, National Defense Service Medal, Special Operations Ribbon (3 awards), Bicentennial Unit Commendation Ribbon, Antarctica Service Medal, Arctic Service Medal, Sea Service Deployment Ribbon, Expert Rifleman Medal, and the Expert Pistol Shot Medal.

Rear Admiral Brown is married to the former Monica Hayes of Groton, CT and they have two children.

Contracting Out Notice

Systems is updating our policy on "Contracting Out." We recognize that the issue is contentious and volatile. Together, we must grapple with the issue and open frank discussion within the engineering/logistics community about the costs, benefits and risks.

Our current policy statement can be summarized as "Outsourcing what makes sense." That is simply not a sufficient policy statement. This notice is to open dialog, in a no fault, no risk, candid and open environment, so we might understand your concerns and misgivings. This is not going to be a "complaint session" as that is not constructive. It is a solicitation for critical thought on the subject of contracting out. Look at it as an opportunity to "vent" your thoughts and concerns.

The "venting" will end on 31 October 2003. Then your input will be consolidated and will ultimately result in a new Systems policy that reflects our position on contracting out engineering and logistics support services. Expect a formal policy statement in early spring 2004.

There are currently two places where one can discuss the issue: military.com > Coast Guard Discussions > Point Counter Point > Contracting Out Support Services and also the CG Intranet, Systems homepage, http://cgweb.comdt.uscg.mil/g-s/gs.htm - "hit" Quick Link, scroll to bottom, pick Forum on Contracting Out.

Of particular value will be those comments that address specific, measurable, objective criteria that must be considered before any intelligent decision might be made to contract out (or not) any particular function. POC is jyacobi@comdt.uscg.mil or 202-267-1848.

Standing up Information Systems Technician "A" School:

New School, Higher Throughput Demands.

by LTJG Raina Clark
Training Center Petaluma

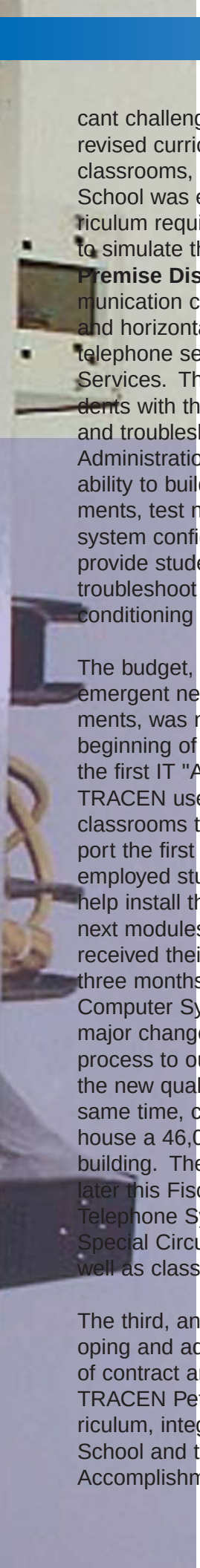
Standing up a new "A" School under normal circumstances is a challenge. Yet, the fledgling Information Systems Technician (IT) "A" school at Training Center (TRACEN) Petaluma must also support the need for increased student throughput in the post 9/11 environment. The school is a result of the Joint Ratings Review (JRR), the largest reorganization of the Coast Guard enlisted ratings since World War II. Before transitioning to IT "A" School, Telephone Technician (TT) "A" School graduated 42 students annually. As a result of the ongoing growth of the Coast Guard, IT "A" School was tasked with producing 168 students this year to catch up with the field's needs. In January, 2004, IT "A" School will see a new class convene every three weeks with 112 students on board at full capacity, graduating 224 students per year.

Kathy Thore, TRACEN Petaluma's Computer Systems Branch Chief and Master Chief Swanson, former TT "A" School Chief, combined their staffs to implement IT "A" School. They agree that their three most challenging tasks are blending a growing instructor staff, constructing and outfitting classrooms, and adapting to new curriculum.

Kathy Thore must grow her branch's staff quickly enough to meet the throughput demands while Master Chief Swanson, now the IT "A" School Chief, must combine the knowledge and skills of a diverse group of instructors. TT "A" School and the Information Systems Management (ISM) Course together operated with just nine instructors, but at full capacity IT "A" School will require a staff of 23. To meet this need the school depends in part on civilian contractors. Today, half of the IT "A" School staff are Perot Systems and Titan Corporation employees and more contract instructors are on their way. Unlike Operations Specialist (OS) and Electronics Technician (ET) "A" Schools, which depend heavily on contract instructors with military backgrounds, IT "A" School calls for systems management and telecommunications experience which are more readily available in the civilian sector. Many of the contract instructors previously worked for companies such as Nortel and Alcatel and have experience as senior technical instructors, help desk managers, software diagnostic engineers, and systems verification testers.

Master Chief Swanson employs a great deal of job shadowing to blend the civilian contract instructors, the ISM Course and former TT "A" School staffs, and the incoming active duty instructors. The five active duty instructors come from the former TT and Telecommunications Specialist (TC) rating. Instructors from the former TCs received on the job training in telephony from their TT counterparts and contractors received on the job training from their active duty counterparts on Coast Guard specific equipment and policies. As the instructor team was being built, only a few qualified trainers were on the podium and many hours of overtime were dedicated to ensuring students continued to receive quality instruction during the transition.

Obtaining and outfitting classrooms in time to receive incoming classes is a second signifi-



cant challenge. The increased throughput and revised curriculum demanded nine IT "A" School classrooms, seven more than the former TT "A" School was equipped with. The IT "A" school curriculum requires elaborate classroom environments to simulate the work performed in the field. The **Premise Distribution classroom** contains telecommunication closets where students install backbone and horizontal cables, Private Branch Exchange telephone services, and Electronic Key System Services. The **Fiber Optic classroom** provides students with the facilities to install and test fiber optics and troubleshoot fiber optic problems. System Administration labs are set up to test the students' ability to build and maintain Client/Server environments, test network connectivity, and troubleshoot system configuration. The **Special Circuits rooms** provide students with an environment to identify and troubleshoot different types of circuits including line conditioning equipment and channel banks.

The budget, along with supplemental funding for emergent needs and previously unfunded requirements, was not distributed until six months after the beginning of the fiscal year and three months after the first IT "A" convening. Before the funds arrived TRACEN used local dollars to build IT "A" School classrooms to the minimum instruction level to support the first modules of the course. The school employed students from the first three classes to help install the new equipment just in time for the next modules of their curriculum. When the school received their budget in April, 2003, they had just three months to spend 75% of the funds. The Computer Systems Branch, already dealing with major change, quickly navigated the procurement process to outfit the remaining classrooms to meet the new quals and curriculum requirements. At the same time, construction began on a new site to house a 46,000 square foot modular classroom building. The building is scheduled to be complete later this Fiscal Year [FY03] and will include Telephone Systems, System Administration and Special Circuits classrooms for IT "A" School as well as classrooms for OS and ET "A" Schools.

The third, and perhaps greatest challenge, is developing and adjusting to the new curriculum. A team of contract and active duty JRR course writers at TRACEN Petaluma created the IT "A" School curriculum, integrating elements of the former TT "A" School and the ISM Course. The team used the Accomplishment-based Curriculum Development methodology, the IT3 Enlisted Performance Qualifications, and data collected during the JRR Implementation Planning effort. It is one of the longest "A" Schools at 24 weeks. Completion of the course was delayed, but IT "A" classes reported on board as scheduled. Course writers continued to develop the curriculum while instructors delivered the completed portions of the course to the first students. Instructors and students in the first IT "A" class worked late and through the weekends to ensure the material was understood. Over the next year, the staff will collect lessons learned and note those things that work well and those that need improvement. At about that time the curriculum will need to be adjusted for the Coast Guard's deployment of Windows Server 2003.

The goal of information systems is to "deliver the right information to the right people at the right time to support all Coast Guard missions," as the JRR Information Technology Focus Group put it. Despite the obstacles, TRACEN Petaluma is producing confident and competent graduates who will be vital to achieving this goal. The first IT "A" School class, along with the first ET and OS "A" School classes graduated on 1 July 2003. Students and staff were honored by the presence of RADM Breckenridge, the Maintenance and Logistics Command Pacific Commander who also presented Petaluma's JRR Implementation Team with Meritorious Team Commendation awards. Of the 13 IT "A" School graduates, four received orders to CAMSPAC (Communications Area Master Station Pacific), six to cutters, two to CAMSLANT, and one to a Reserve Unit. There they will be responsible for establishing and maintaining systems that collect, store, process, and forward all voice, data, and video information.

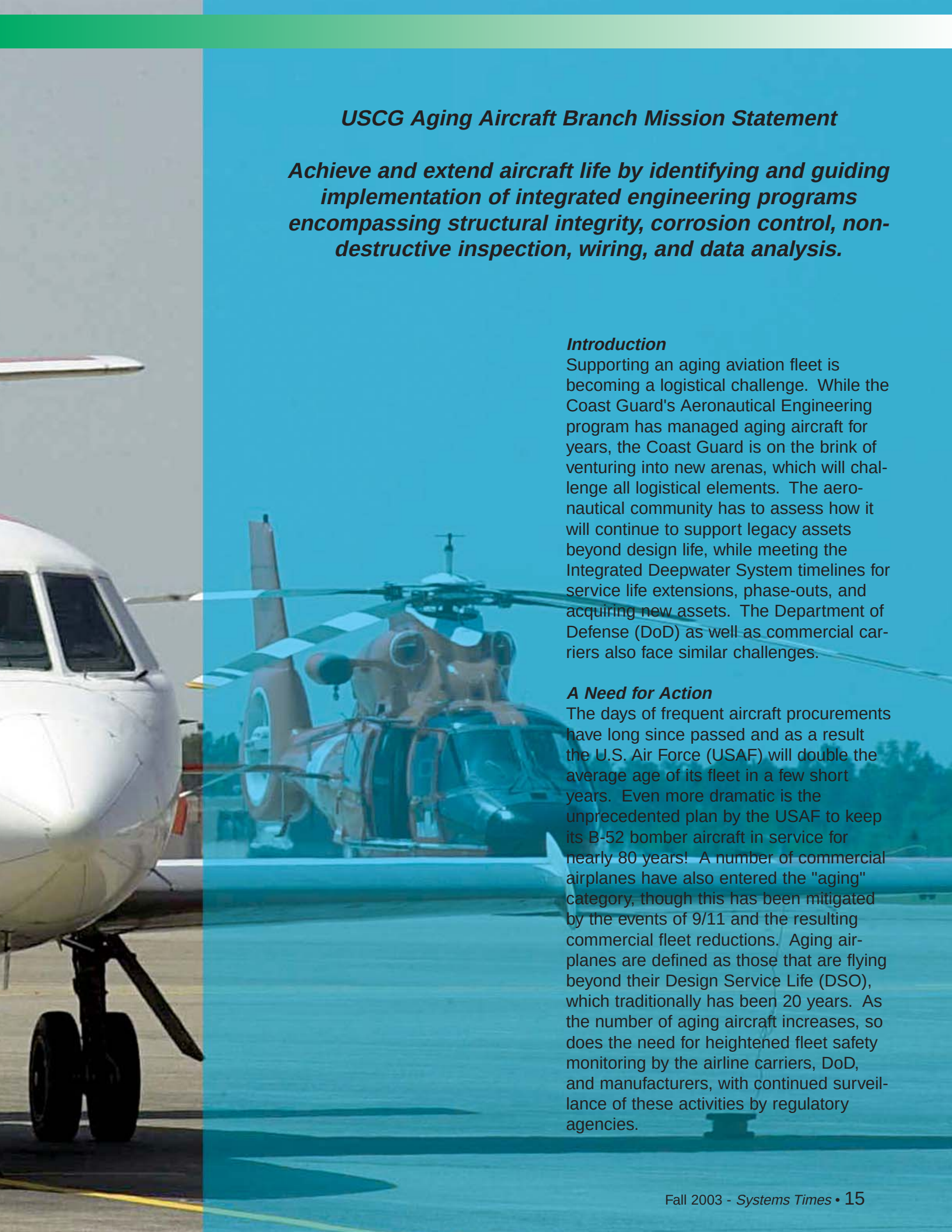
Ms. Thore sums up her branch's journey noting that "in the midst of delivering the old TT curriculum in old TT classrooms, learning new IT curriculum on the fly, researching and submitting $2.8M in procurements to build new classrooms, melding Coast Guard and contract staffs, and significantly increasing our training schedule, there was only willingness and dedication to make the stand-up of IT School a reality." She had high praise for her staff, stating, "each member of the IT School staff, especially MCPO Swanson who had to juggle resources, provide technical guidance and maintain morale, is highly commended for their exceptional performance and professionalism."

Launching the USCG's Aging Aircraft Branch

At the Aircraft Repair & Supply Center Elizabeth City, NC

by CDR Patrick Dwyer
Aircraft Repair and Supply Center
edited by LCDR Scott Craig
Office of Aeronautical Engineering

USCG photo by PA1 Jeff Hall.



USCG Aging Aircraft Branch Mission Statement

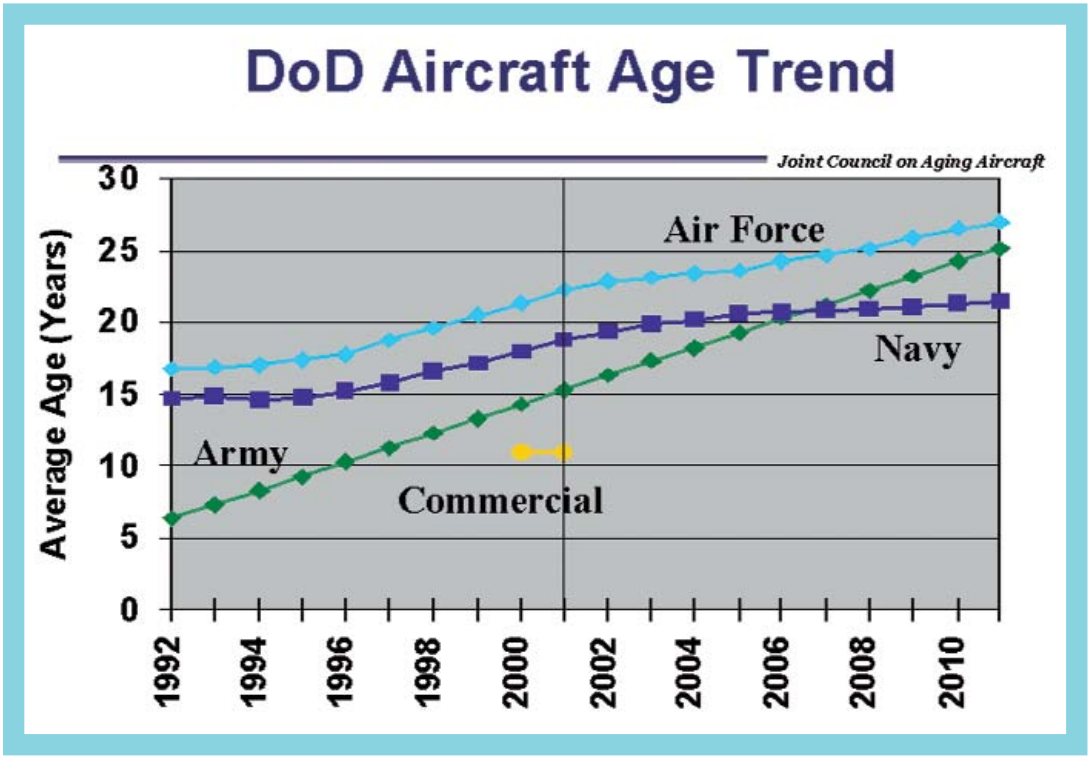
Achieve and extend aircraft life by identifying and guiding implementation of integrated engineering programs encompassing structural integrity, corrosion control, non-destructive inspection, wiring, and data analysis.

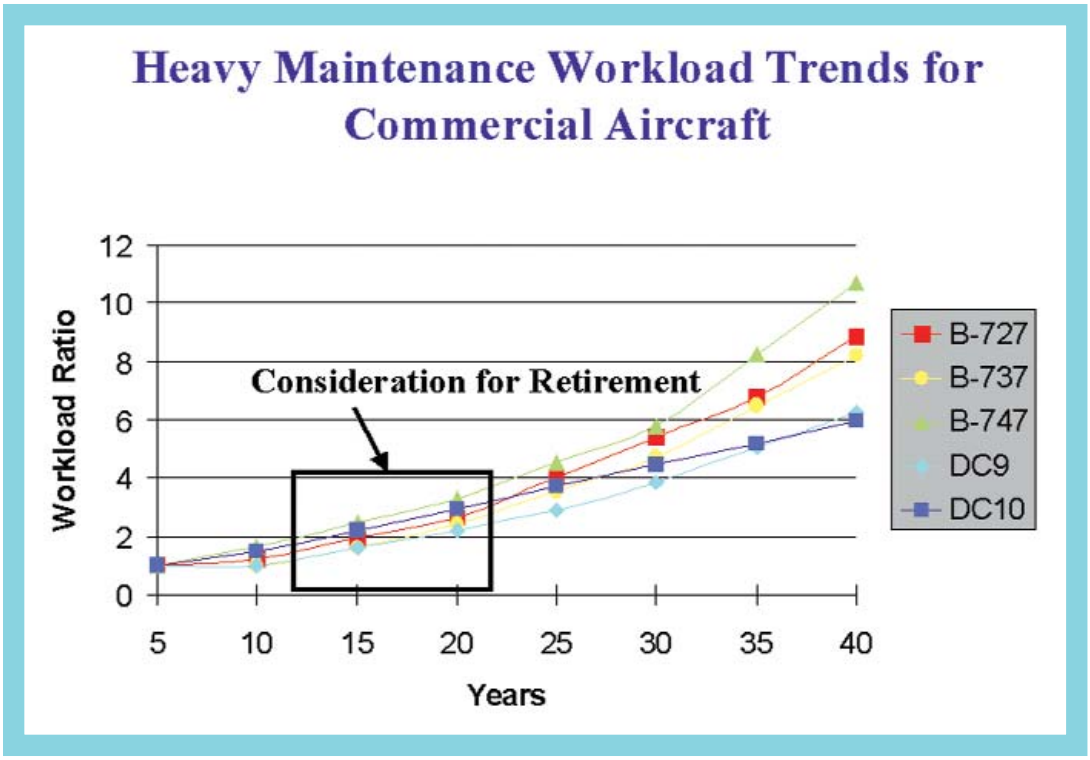
Introduction

Supporting an aging aviation fleet is becoming a logistical challenge. While the Coast Guard's Aeronautical Engineering program has managed aging aircraft for years, the Coast Guard is on the brink of venturing into new arenas, which will challenge all logistical elements. The aeronautical community has to assess how it will continue to support legacy assets beyond design life, while meeting the Integrated Deepwater System timelines for service life extensions, phase-outs, and acquiring new assets. The Department of Defense (DoD) as well as commercial carriers also face similar challenges.

A Need for Action

The days of frequent aircraft procurements have long since passed and as a result the U.S. Air Force (USAF) will double the average age of its fleet in a few short years. Even more dramatic is the unprecedented plan by the USAF to keep its B-52 bomber aircraft in service for nearly 80 years! A number of commercial airplanes have also entered the "aging" category, though this has been mitigated by the events of 9/11 and the resulting commercial fleet reductions. Aging airplanes are defined as those that are flying beyond their Design Service Life (DSO), which traditionally has been 20 years. As the number of aging aircraft increases, so does the need for heightened fleet safety monitoring by the airline carriers, DoD, and manufacturers, with continued surveillance of these activities by regulatory agencies.





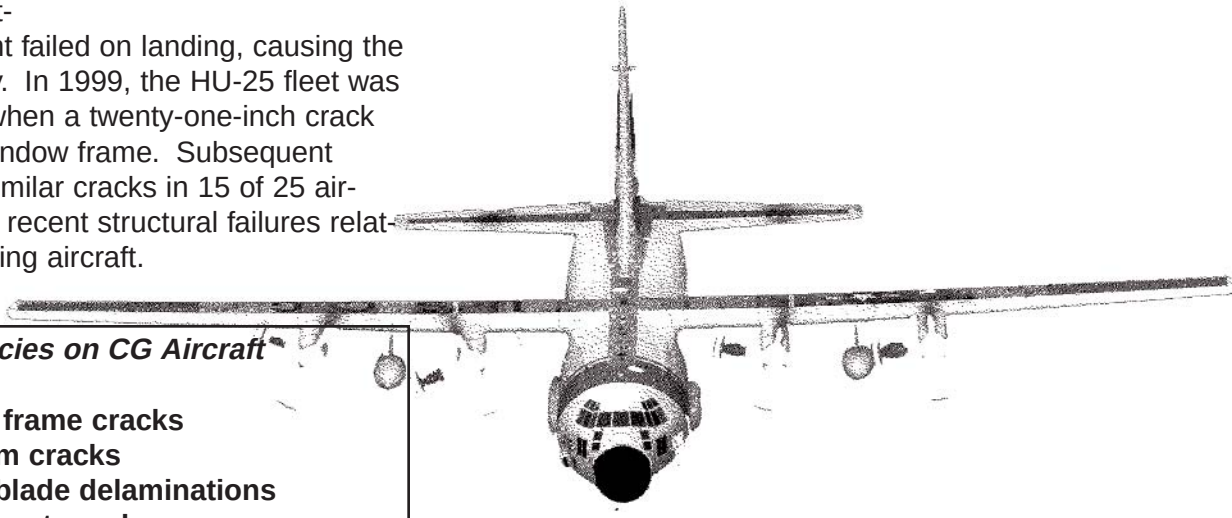
DoD average age of aircraft continues to climb. USAF B-52 Bombers will remain in service for 80 years. Commercial carriers are also facing aging aircraft issues.

The Federal Aviation Administration (FAA) and DoD were forced to explore the effects of aging aircraft in more detail when the public's awareness of corrosion was raised due to the 1988 mishap involving an Aloha Airline's Boeing 737. The top of the aircraft's forward cabin peeled off in flight resulting in the loss of one flight attendant but a miraculous recovery of the airliner by a skilled and courageous crew. This tragic occurrence was the impetus for the first International Conference on Aging Aircraft and enactment of the 1991 Aging Aircraft Safety Act. However, aging aircraft continue to be a problem as was recently witnessed during the televised crash of a 40 year-old U.S. Forestry C-130 that experienced an in-flight breakup while fighting forest fires over California last summer.

The effects of stress corrosion cracking coupled with lap joint corrosion were just some of the mechanisms that contributed to the damage of the Aloha Airlines Boeing 737-297 aircraft. Multiple Site Damage or MSD to a major portion of the upper crown skin and structure of section 43 caused separation in flight, allowing 18 feet of cabin fuselage to be blown off while the aircraft was cruising at an altitude of 24,000 feet (FL 240).

Tragically, after the accident, a passenger stated that as she was boarding the airplane through the jet bridge at Hilo, she observed a longitudinal fuselage crack. The crack was in the upper row of rivets along the S-10L lap joint, about halfway between the cabin door and the edge of the jet bridge hood. She made no mention of the observation to the airline ground personnel or flight crew.

The Coast Guard is not immune to these occurrences, though a more proactive approach has reduced the severity of these events. Recent mishaps include the failure of the main outboard engine truss mount tang on a HC-130 that went undetected until the truss mount failed on landing, causing the aircraft to yaw severely. In 1999, the HU-25 fleet was momentarily crippled when a twenty-one-inch crack was discovered in a window frame. Subsequent inspections revealed similar cracks in 15 of 25 aircraft. Below is a list of recent structural failures related to corrosion and aging aircraft.

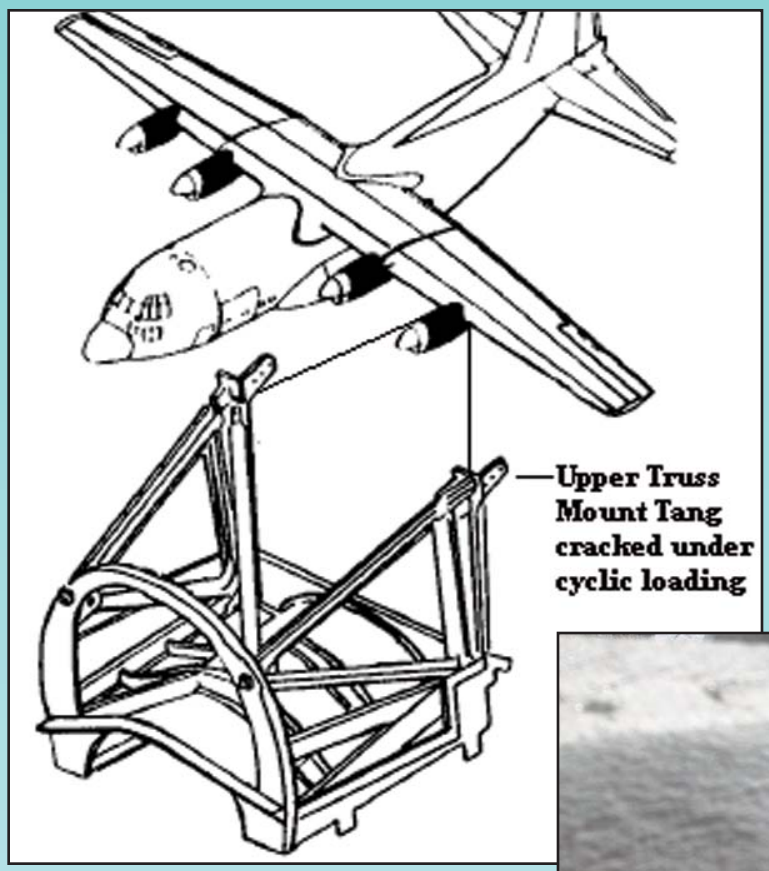


Discrepancies on CG Aircraft

- **HU-25 window frame cracks**
- **H-60 main beam cracks**
- **H-65 tail rotor blade delaminations**
- **C-130 truss mount cracks**
- **MH-58A (HITRON) main rotor head damper and tail rotor blade fatigue cracks**

C-130 Outer Truss Mount Crack

The left wing outboard engine of the C-130 has two primary truss mounts that connect the engine and nacelle on to the wing spar. The failure captured in the below picture shows the through-crack of the outboard truss mount. This crack, when analyzed closer, clearly showed signs of cyclic fatigue as evidenced by the classic "beech" marks on the fractured surface.

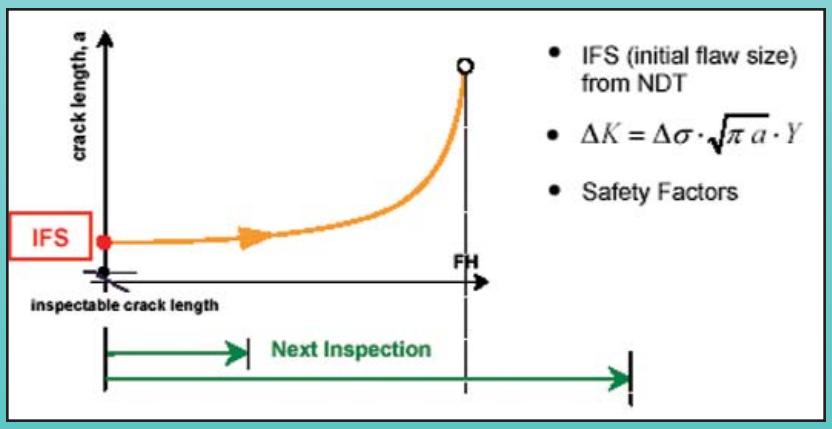


These types of cracks are becoming more frequent especially on the older 1500 series HC-130 aircraft manufactured in the early 1970s. Since 1999, the Coast Guard and the U.S. Air Force have been implementing a plan to replace all C-130 truss mounts during depot. While this remains encouraging, the effects of fatigue continue to grow across the Coast Guard aviation fleet.

As aircraft get older, the primary threats to their structural integrity are widespread fatigue damage and hidden corrosion. Specific needs for aging aircraft include the detection of fatigue cracks under fasteners, small cracks associated with widespread fatigue damage, hidden corrosion, cracks and corrosion in multi-layer structures, and stress corrosion cracking in thick sections. Raising the awareness, understanding, and management of structural integrity issues dealing with Multi-Site Fatigue Damage (MSD), cyclic fatigue, stress corrosion cracking, damage-tolerance design versus fail-safe design, and a more aggressive depot level Non-Destructive Inspection (NDI) program are essential to support our aging fleet.

So what exactly is cyclic fatigue and why should we be concerned about it?

A simple analogy of cycle fatigue can best be described as to what occurs when "bending" a paper clip back and forth. Given enough cycles the paper clip eventually breaks. Now imagine that same paper clip soaking in salt water for a day or so and then repeat the process. Now make matters worse by cutting a notch in the paper clip and soak it in salt water and repeat the "bending." The big picture begins to materialize. Next increase the amplitude of the cycles and notice how rapidly the life diminishes of the paper clip that has been notched and soaked in salt water. The key is being able to detect that notch, crack, or pit and understanding or capturing the amplitudes of the forces at work in the structure. Having the proper equipment and understanding of crack growth allows maintainers to develop the proper inspection intervals with the proper equipment to ultimately detect the flaw before it can lead to failure of the structure or component.



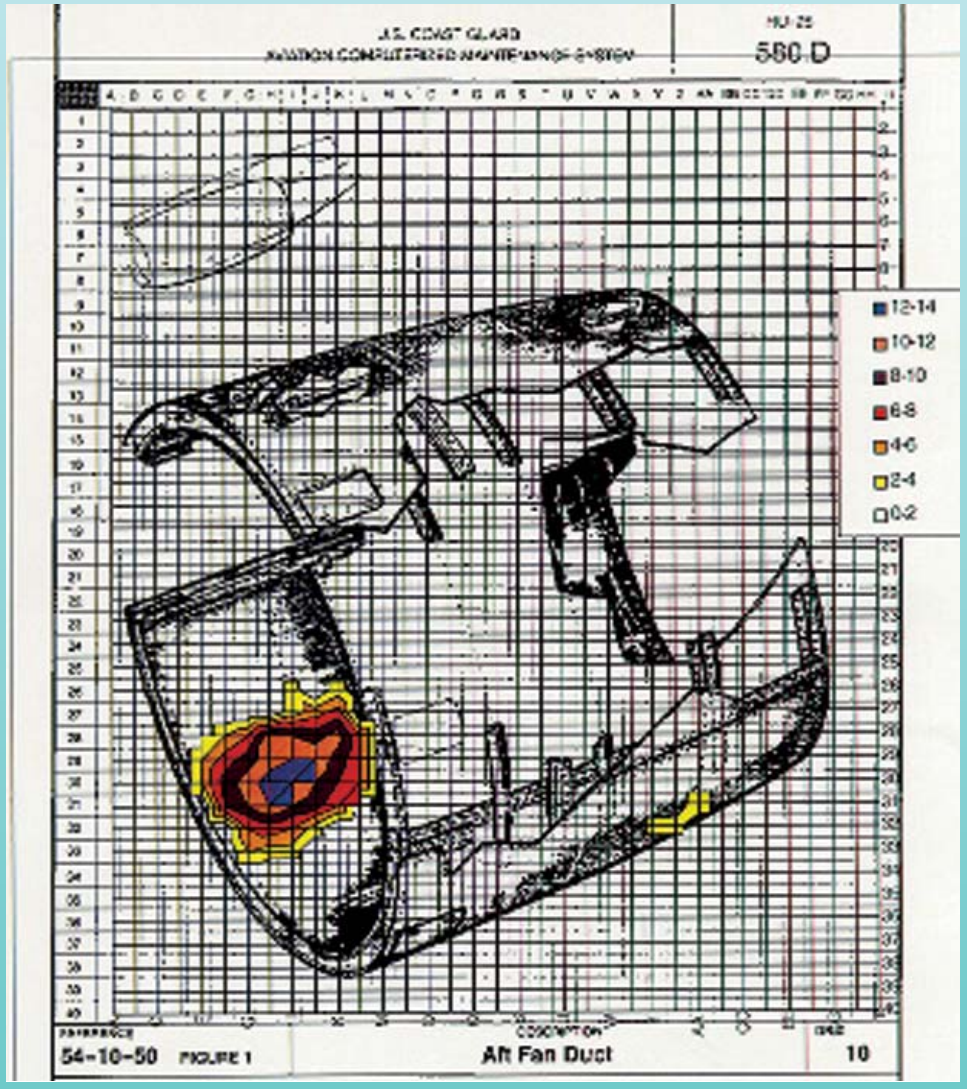
The graph at the left depicts the fracture mechanics behind understanding initial flaw size from NDT inspections and adjusting inspection intervals before the fracture leads to failure.

The Aging Aircraft Branch

Each of the Armed Forces has branches or divisions dedicated to the structural integrity of its assets. These branches are supporting what is commonly referred to in the aeronautical community as an Aircraft Structure Integrity Program or ASIP. The Coast Guard's Aging Aircraft Branch working for the Chief of the Engineering and Industrial Support Division (EISD) at the Aircraft Repair and Supply Center (ARSC) was formed in the fall of 2001. Its initial purpose was to integrate the Corrosion and Reliability Centered Maintenance (RCM) Branches at ARSC. However, the growing impact of corrosion, fatigue, and wiring problems on legacy aviation assets has shifted the branch's focus to address these degrading factors. The redesigned branch has grown to include concentrated programs in the areas of non-destructive testing, wiring, materials, corrosion, and redefining the RCM Cell more broadly as a Reliability Cell. The branch has diligently attempted to build the foundation of resources and systems that will meet current and future aeronautical maintenance activities. A cornerstone of that foundation has been to elevate the awareness of aging to maintainers and trainers, as well as operators. The Aging Aircraft Branch is educating these personnel about corrosion, fatigue cracking, and wiring using information extracted from the Aviation Computerized Maintenance System (ACMS), Programmed Depot Maintenance (PDM), and "tiger" or field support team findings.

With the addition of a Level III (highest quality) Non-Destructive Inspection Program Manager, the Coast Guard is developing a certified NDI Program. This manager provides the necessary oversight to ensure per-

sonnel at ARSC, as well as selected unit personnel, are given the tools and schooling to perform critical NDI inspections. The field of Non-Destructive Testing (NDT) has been expanded to include thermo-graphic imaging to identify sub-surface de-bonding on the HU-25 and HH-65, as well as providing modern, standard equipment for the field. A partnership with Sandia Laboratories and the Aviation Technical Training Center (ATTC) for the initial training of selected NDI inspectors is currently in place and expanding. The need to provide standardized equipment plus field level awareness and confidence in executing specific NDI inspections is vital to the continued airworthiness of the fleet. Expanding depot inspections with more sophisticated equipment, like thermo-graphic detectors, will increase the probability of detecting fatigue cracks and corrosion.



Corrosion Mapping is just one example of how the Corrosion Cell works with ACMS data to track and monitor corrosion as it gets detected at Programmed Depot Maintenance at ARSC. Additional efforts are underway to expand mapping to the field units to allow more data to be inputted to the ACMS database.

Wiring discrepancies have been growing at an alarming rate across both commercial (TWA 800, Swiss Air 111 mishaps) and military fleets. EISD placed its electrical engineer into the Aging Aircraft Branch to address a number of wiring issues internal to the Coast Guard. The success of current wiring initiatives at ARSC, like the circuit analysis testing performed by DTMCO's (*trade name*) analyzer system, is being pursued for all aircraft types to reduce PDM flow days and to decrease troubleshooting. The wiring program manager is also working closely with the Corrosion Cell to address not only the aging of our wiring systems, but also the corrosion of connectors and the application of suitable Corrosion Preventative Compounds (CPC) to mitigate corrosion occurring at the black box to wiring interface. A variety of joint service tests are currently underway to identify CPCs that will best perform on our fleet of aircraft. Dehumidification is also being developed for future unit-level use to reduce the no-fault found discrepancies that commonly result from micro-corrosion at the mating surfaces of avionics components.

Corrosion and its effect on a variety of materials is another area of immediate concern. Even limited corrosion has a significant impact on both structural fatigue life (~10X or greater) and fatigue strength (~25% or

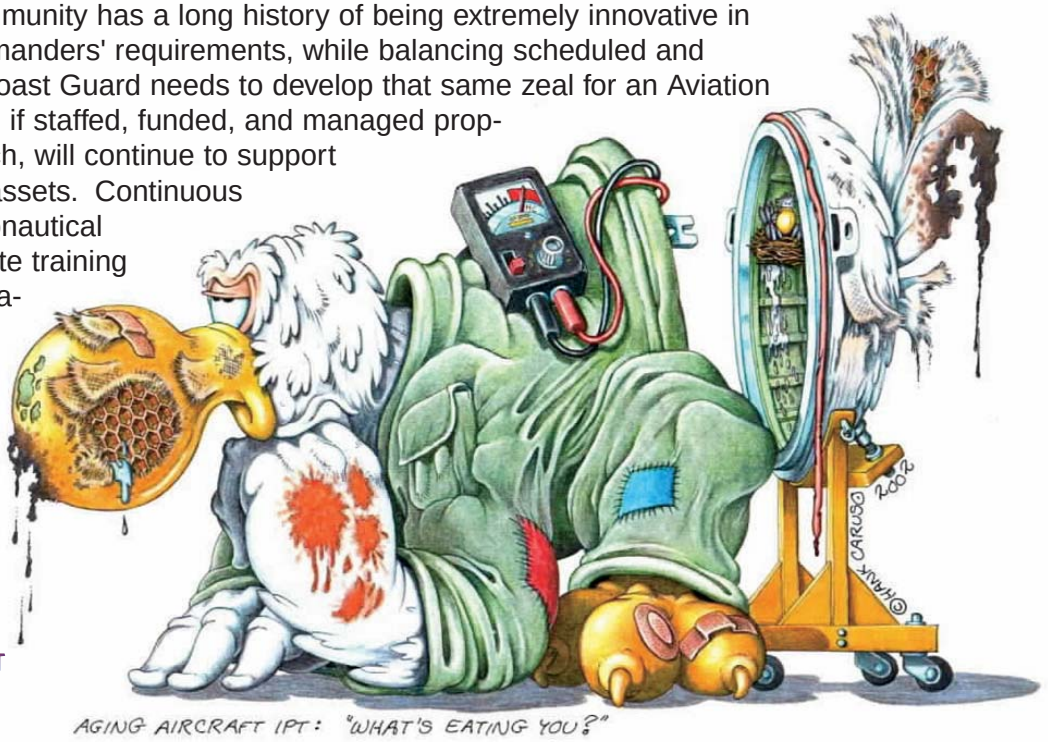
greater loss) (*Source: Mr. C. Paul, AFRL Air Vehicles Directorate, Wright Patterson Air Force Base*). Corrosion mapping efforts, shown on page 20, as well as tailoring PDM intervals to geographic locations, can reduce excessive corrosion. For instance, an HH-65 operating in the harsh corrosive environment of Corpus Christi, Texas, requires a shorter PDM interval than an aircraft operating in Traverse City, Michigan. Capturing information via a Structural Data Recorder installed on each aircraft is another way to get data and tailor maintenance to a specific aircraft's needs based on actual g-loading (gravitational effects) during flight. This system will be available on the new HC-130J, but is nonexistent in our current fleet.

Finally, the Reliability Cell has expanded to include analysts for both the rotary and fixed wing Product Lines. Using a wide variety of data, these analysts can research maintenance trends for the various Product Line Managers to determine problems before they become of a critical nature. To support the ever-growing scrutiny that the parts inventory receives, the Reliability Cell is also emerging as a conduit of critical information between ACMS and the Aviation Maintenance Management Information System, the central logistics database of Coast Guard aviation. It is this expanded role that is broadening the scope of traditional RCM to include the entire maintenance and logistics system.

The Future

The success of the Aging Aircraft Branch rests on its ability to integrate the talents of the branch's personnel and to acquire the resources to address aging aircraft issues. One way the Aging Aircraft Branch is doing this is by tapping into the existing experience of industry, academia, and government. This forum exists through the branch's attainment of Primary Charter membership on the Joint Council of Aging Aircraft (JCAA), an organization comprised of the Armed Services, the FAA, and the Defense Logistics Agency (DLA). The focus of the JCAA is to leverage each Service's talents and resources, and to provide guidance to the Council's steering groups in the disciplines of corrosion, wiring, avionics, and dynamic components.

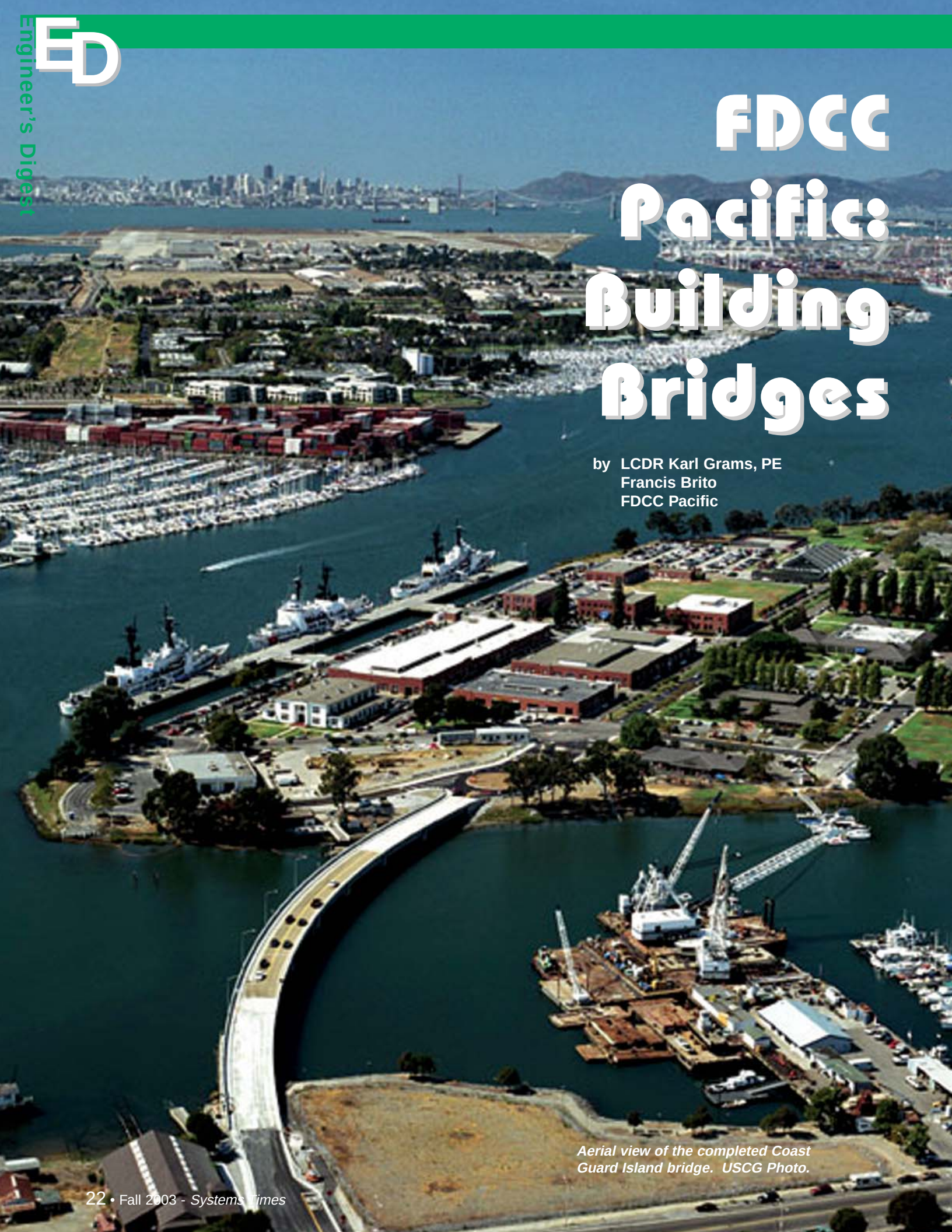
The Aeronautical Engineering community has a long history of being extremely innovative in order to fulfill the operational commanders' requirements, while balancing scheduled and unscheduled maintenance. The Coast Guard needs to develop that same zeal for an Aviation Structural Integrity Program, which if staffed, funded, and managed properly under the Aging Aircraft Branch, will continue to support our legacy and future Deepwater assets. Continuous support of G-SEA's (Office of Aeronautical Engineering) "tabs" for postgraduate training in structures cannot be over emphasized. Exposing our current and future aeronautical engineers and maintenance technicians to the effects of corrosion and fatigue will long serve the vital interests of the Coast Guard. The Coast Guard Aging Aircraft Branch at ARSC invites you to visit their web site at http://arsc-webstage/eisd/aging/index.html.



AGING AIRCRAFT IPT: "WHAT'S EATING YOU?"

FDCC Pacific: Building Bridges

by LCDR Karl Grams, PE
Francis Brito
FDCC Pacific



Aerial view of the completed Coast Guard Island bridge. USCG Photo.

Without fanfare the new bridge, linking Integrated Support Command (ISC) Alameda with the City of Oakland, was fully open for traffic on 2 October 2002. The project was completed ahead of schedule, with a total construction cost of less than three percent over the original construction award, and no construction claims! This successful showcase project is a testimony to the rewarding outcomes of sustained planning, "cross unit" teamwork, proactive partnering, and attention to detail. The intent of this article is to inform the reader on what worked well and what might have gone better in the hopes that future Coast Guard projects with similar complexities or construction elements might benefit from our experience.

ISC Alameda hosts the second largest concentration of Coast Guard personnel, including commands such as Pacific Area (PACAREA), Joint Inter Agency Task Force West (JIATF (West)), Maintenance and Logistics Command Pacific (MLC(Pac)), and four High Endurance Cutters. The original timber trestle bridge built in the 1920's provided the only access to the Island, and carried all the utilities, except electric power. By the early 1990's it had reached the end of its service life. It was subject to extremely restrictive vehicular load limits, was seismically vulnerable, and required significant ongoing maintenance.

The schematic design for a replacement and $8 million project budget were approved in 1996. The project received Fiscal Year 2001 (FY01) funding and final design started in April 2000. Construction bids were solicited in February 2001, with construction taking place between May 2001 and October 2002. Project design objectives included:

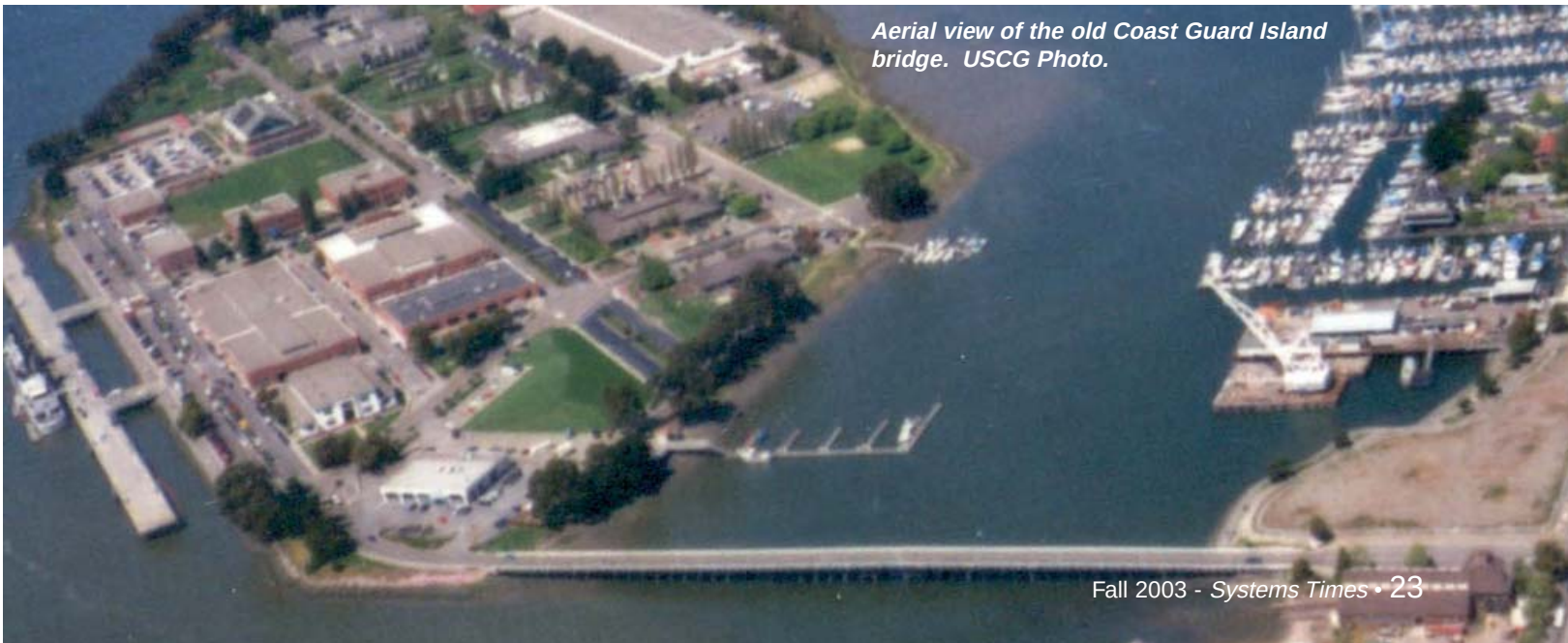
- Provide for low maintenance, environmentally friendly, reliable access (vehicular, pedestrians, and cyclists) to Coast Guard Island for the next 75 years.
- Relocate the bridge's island entrance consistent with the Master Plan, significantly easing access to facilities on the Island, while improving traffic flow -- this new alignment would require a curved bridge structure, new approaches, as well as a traffic roundabout on the island side.
- Provide a new, aesthetically pleasing and secure gatehouse, and capability for improved security.

Requirements during construction included:

- Continued access to the Island during construction, with minimal impacts to Coast Guard operations.
- Minimal disruption to utilities, especially communications.
- Appropriate and timely notification to the various Island tenants on project status and impacts.

Upfront Project Challenges

This project was rift with challenges not unlike those facing most Coast Guard projects these days. Besides the typical budgetary pressures the project team was faced with:



Aerial view of the old Coast Guard Island bridge. USCG Photo.

- Dealing with a tight construction site. The Oakland (east) side was constrained by the existing street right-of-way, the 100-mile San Francisco Bay trail, and an adjacent State Superfund site. This required that the new and old bridges have the same termination point on the Oakland side of the bridge.
- Transitioning the Island's only sources of telecom, gas, water, sewer, and cable TV service, and minimizing disruption both during cutover activities as well as during general construction operations. This required significant upfront customer coordination/agreements with the utility providers.
- In-water work could only be performed from the north due to the existing bridge lying to the south. The in-water north side of the project site was also constrained as the owner (Port of Oakland) had leased it for private industry use.
- Driving piles in unpredictable soft bay mud, and through a field of abandoned and existing bridge piling. Additionally, all in-water work (old pile demolition and new pile driving) had to be done within a regulated "window of construction."
- Load restrictions associated with bringing construction equipment and materials across the existing bridge.
- Numerous bridge seismic retrofit projects, in the San Francisco Bay Area and the rest of California, with considerably larger budget estimates, were being readied at the same time as this project would be put out to bid; cost escalations associated with this bidding climate were not anticipated/included in the approved project budget.

Design Phase

During the design stage, meetings were held with stakeholders and customers, to coordinate efforts and develop strategies on issues related to the relocation of utilities from the old bridge to the new, traffic circulation during construction, operational needs and providing project progress reports. A particularly beneficial outcome of these efforts was the decision to make allowances in the main bridge contract for a separate contract between MLCP(t) (Electronics Systems Division) and the telephone company for cutovers of their utilities. This work was superbly accomplished with a lot of pre-planning on MLCP(t)'s part. Thus the utility company's portion could be completed in a much shorter time.

The Team

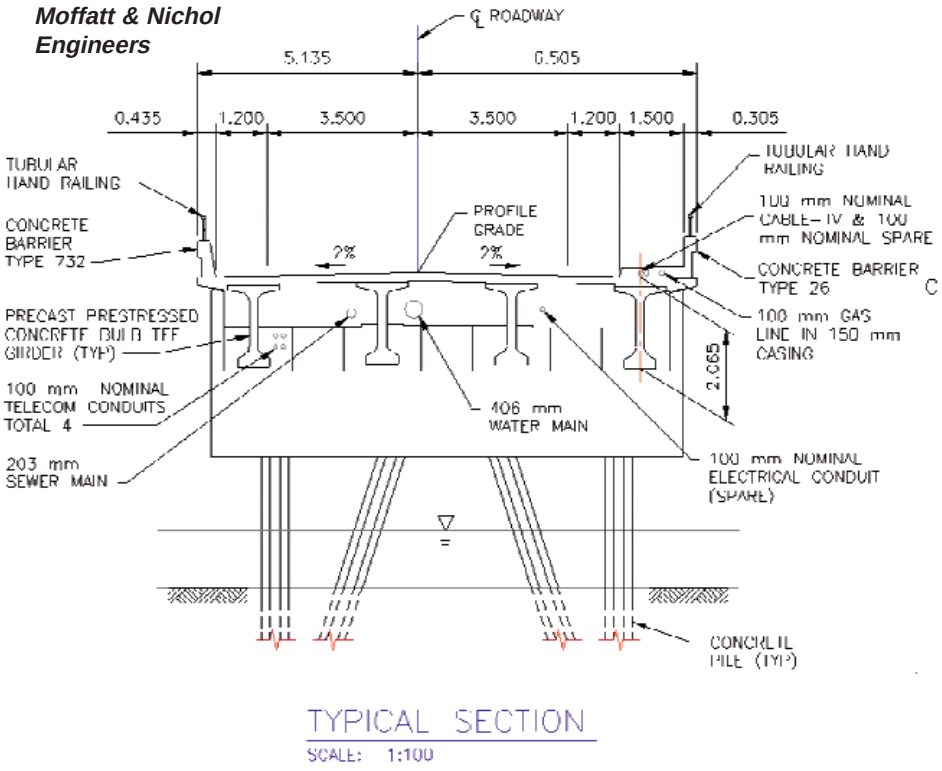
FDCCPAC	
Debra Chinn	*Design Engineer-in-Charge*
LCDR Grams	*Construction Project Manager*
Robert Powers	*Resident Construction Inspector*
LT Carroll	*Resident Construction Inspector*
John Vogel	*Environmental Specialist*
BETA Division	*In-house Design*
William Denman	*Contracting Officer*
Robert Ferguson	*Attorney Advisor*
Jeff McCalib	*Cost Estimating Specialist*
Martin Boivin	*Senior Member for Construction Partnering*
MLCPAC & ISC Alameda	
CAPT Lachowsky	*MLCP(s)*
CAPT Mackell	*MLCP(l)*
CDR Ely	*MLCP(tp)*
Sherry Shirkey	*MLCP(sr)*
John Wahl	*MLCP(te-4)*
CDR Cunningham	*Facilities Engineer*
Moffatt & Nichol Engineers	*Bridge Engineering*
Dutra Construction	*Prime Contractor*

The San Francisco Bay area is a region of severe seismic activity, and the standard solution would be the use of a "plumb-pile" system. However, to keep the project within budget, an innovative structural solution was required: the use of an all-batter pile system. With the advances in modeling technology, Moffat and Nichol were able to successfully engineer and detail an all batter pile system to satisfy the extreme lateral loading conditions. Further, the added stiffness provided by the batter piling allowed cost reductions in the choice of precast superstructure elements. To minimize the number of bridge spans (and in-water piers), recently developed long-span bulb-tee girders were chosen. The new bridge has a 40-degree horizontal curve as well as vertical curves, resulting in varying span lengths. Formwork costs were kept down by using specially designed bulb-tee cross-sections. These efforts helped reduce bridge costs by a minimum of $750,000. An additional design feature was the ability of the bridge to remain serviceable, even following the loss of two piles at any pier; for example, as a result of a vessel impact. The bridge superstructure (girders and decking) is separated from the substructure (piers and abutments) by use of elastomeric bearings. Deck continuity was provided by closure pours at non-expansion joint piers. This allows for a smoother ride compared with a bridge made up of simple spans. Expansion joints are located at approximately the one-third points on the bridge. Lateral loads from the superstructure are transmitted to the substructure via shear-keys.

Bridge Facts

Length	260 meters (852 feet)
Spans	Three at 31 meters (102 feet) Three at 32 meters (105 feet) Three at 35 meters (115 feet)
Cross-section	Two 3.5-meter (~12 foot) traffic lanes Two 1.2-meter (~4 foot) bicycle lanes One 1.5-meter (~5 foot) sidewalk
Piers	Seven in-water piers, each supported by eight 610-mm (24 inch) octagonal batter piles

Typical Section. Section looking east. Gas line later moved to north concrete barrier. Moffatt & Nichol Engineers



TYPICAL SECTION
SCALE: 1:100

Environmental and aesthetic considerations were also important. The new bridge provides much safer pedestrian and bicycle access to the Island. The bridge guardrail design maximizes scenic views while providing necessary safety. Public shoreline access was improved. The trestle, with its creosote-treated wood piling was demolished. Shoreline areas on Coast Guard Island were planted with native aquatic vegetation for additional fish habitat. The new bridge provided increased access and under pier natural lighting, improving fish habitat and vessel navigation.

Construction: Strategies for Success

From early on in the design process, given the engineering and construction

complexities, the project team formulated an action plan to maximize the probability of success. The following paragraphs summarize a few of the actions taken.

A Best Value contracting method was chosen. The following factors were considered in determining which proposal provided the government the best value with technical factors considered approximately equal to price:

- Project Management Ability,
- Experience and Past Performance, and
- Price.

Key to the evaluation of the proposals was the bidder's past relevant performance on similar projects, and the demonstration, using CPM scheduling methods, of their sound understanding of the project requirements. Of particular importance was the bidder's proposed plan to effectively work around the many constraints and complete the work within the stated contract duration.

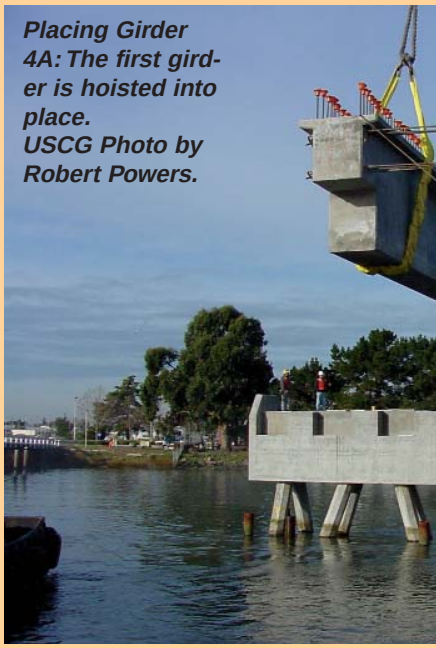
Considerable care was taken in selecting the project team. It was crucial that the team not only be highly competent in their respective fields, but also possess excellent interpersonal skills. As it turned out, some of the contractor's staff were quite difficult to get along with. When our original construction inspector had to unexpectedly relocate out of the area midway through construction, we were willing to give up a little in the experience area in order to keep someone who was equally adept at handling people.

A detailed project procedures manual was developed and distributed to key personnel at the preconstruction conference. This manual briefly expanded on the administrative requirements. It contained tables and flow charts for the proper routing of submittals and Design Clarification Requests (DCRs). Also included were two job aids that pulled requirements from throughout the specifications and consolidated them into a concise easy-to-read format. The first dealt with what items of work required advance notification, how much notice, and to whom. The second listed utility outage restrictions and limitations. Finally the manual provided various phone numbers and points of contact, as well as a copy of all construction forms required.

Section 01010 of the specification invited the contractor to participate in a voluntary partnering program. The desired focus of this program was on the project and not on the individual relationships of those involved. The intent was to agree to strive towards attaining co-developed, mutually beneficial, goals.

The contractor was required to conduct a pre-activity meeting at least three days prior to starting any new activity. Among other items, the purpose was to review the pertinent specification sections, their work plan, and unit coordination responsibilities. The contractor's staff, the government inspector, and consultants as appropriate attended the

Pier 8 Piling at Bridge: Barge Paula Lee. The existing bridge was monitored closely for movement.
USCG Photo by Robert Powers.

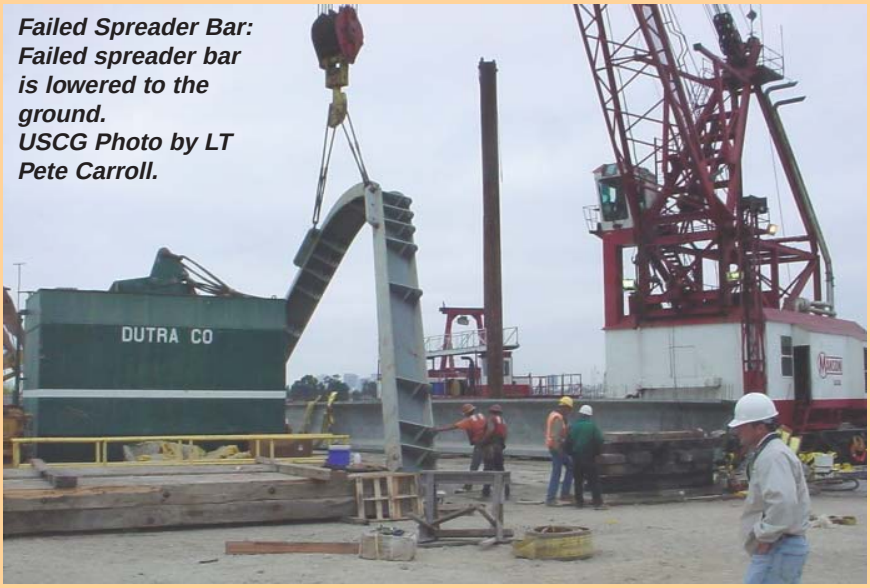


Placing Girder 4A: The first girder is hoisted into place.
USCG Photo by Robert Powers.

Bridge Under Construction

Pier 8 Pile Driving: Pier 8 batter piling. USCG Photo by Robert Powers.

Span 2 Girder set. USCG Photo by Robert Powers.



Failed Spreader Bar: Failed spreader bar is lowered to the ground. USCG Photo by LT Pete Carroll.

Deck Cracking: Such extensive cracking required a state-of-the-art repair. USCG Photo by LT Pete Carroll.

meetings. During these meetings, the opportunity was taken to discuss what-if scenarios and to develop contingency plans ensuring that the contractor had a workable plan, had the manpower and equipment to carry it out, and had performed the necessary amount of customer coordination.

During pile driving operations monitoring of the existing bridge for movement was required. The contract had a unit price line item for installation of temporary piling and support in the event excessive movement occurred. In order to maintain access to the Island's three phases of construction were identified. During the third phase all traffic would transit the new bridge. Two-way traffic would exist on all but the last span. There, one-lane, bi-directional traffic would exist controlled by flaggers or automated signal system. All work of the previous phase had to be completed prior to being allowed to proceed to the next phase. A Coast Guard approved traffic plan was also required prior to the commencement of Phase III.

Pacific Bell telephone stated during design that they required a 90-day window in which to construct new conduits to the demarcation point, to pull new cable, and to make cutovers of all circuits. This requirement was identified in the specifications and the contractor assigned the responsibility to complete the new telecom conduit system as early in construction as possible so as to avoid potential delay waiting for PacBell to complete. As a result of the constructibility review, the design was modified prior to bid, to support the telecom ducts from the girders, thus allowing completion of the ducts prior to completion of the bridge deck.

Since construction would affect ALL the Island's personnel it was vital to have open communications with them. This was approached on multiple levels. CDR Cunningham, ISC's Facilities Engineer, agreed to act as the Island's point-of-contact with the Facility Design and Construction Center (FDCC). In that way ISC was kept abreast of day-to-day progress and coordination with construction was ensured. In addition, FDCC maintained a project web site to keep bridge users informed of the progress during the bid and construction stages. It contained basic project information, points of contact during construction, and a PowerPoint presentation. The presentation fully described the project, construction sequence, timeline, and impacts during construction. After award, the site was expanded to include information on the current status, upcoming traffic and utility disruptions, and progress photos. This information was updated every week or two throughout construction. Finally, for more emergent situations, all-Island e-mail was used to get the word out.

Results

The Best Value process lived up to expectations and the selection board was clearly able to determine which bidder was most qualified. The level of planning required in order to prepare for pre-activity meetings, along with transition plan requirements, greatly contributed to conquering the site, utility, and construction challenges. The procedures manual job aids were posted in the job trailers and kept coordination and customer focus in the forefront. The contractor agreed to facilitated partnering. Choosing an excellent facilitator, the team was

Before

Old east end bridge approach
USCG Photo.

asked to develop goals representing "the 8-foot bar in high jump" -- goals you didn't know quite how to achieve, but felt were a worthy endeavor. The partnering team therefore set some extremely high project goals and surmounted difficult obstacles on the way to their achievement.

The driving of the batter piling, difficult and precision work, went well. Contingency plans were in place when several piles didn't initially reach blow count at max tip elevation. Bridge movements were monitored and temporary support was not needed. After 9/11 there were concerns about manning two gates during Phase II. A plan was developed to eliminate this phase without lengthening the critical Phase III. Completion of PacBell work remained off the critical path. Close communications with the customer and Island were maintained throughout the project.

The project wasn't all smooth sailing though, facing unforeseen challenges that tested ones' ingenuity and mettle. Each of these issues could have seriously delayed completion and increased cost. The Team, in a very positive spirit of partnering, however, successfully faced each and every challenge. The appropriate people quickly touched bases to understand and fix the problem fairly, professionally, quickly, and cost effectively.

The easement process is a long one, but eventually all were granted. However, one of the easements was recorded as 20 feet instead of meters. In addition to that, a subsequent lease was made to a marine construction contractor for the waters adjacent to the bridge. None-the-less, award of the contract had just been made and it was discovered that the pile driving rig needed to drive the piles sat on an approximately 45 foot wide by 200 foot long barge. This piece of equipment needed approximately 120 feet of working area. Complicating matters the marine contractor was one of the unsuccessful bidders on the project. MLCP Legal and Real Property staffs skillfully worked to resolve these delicate issues and construction was not delayed.

Approximately 10,000 SF of concrete deck suffered severe plastic shrinkage cracking caused by what was eventually determined to be batch plant error and equipment failure. Upon discovery a flurry of activity commenced:

- Construction Technology Laboratories (CTL) and a materials testing company were brought on board.
- The California Department of Transportation (CALTRANS) specifications used on the project were reviewed to determine type and/or limit of repair allowed.
- Brought in CALTRANS and repair experts, as well as material suppliers to scope the repair.
- Visited a variety of sites where various repair strategies being considered had been used.
- Presented the government's findings and stated the Coast Guard's requirements for a proper repair.
- Conducted a pre-activity meeting to solidify the repair procedures/expectations. Incorporated meeting minutes into a no cost mod to the contract.
- Put controls in place to prevent a repeat on future deck pours.

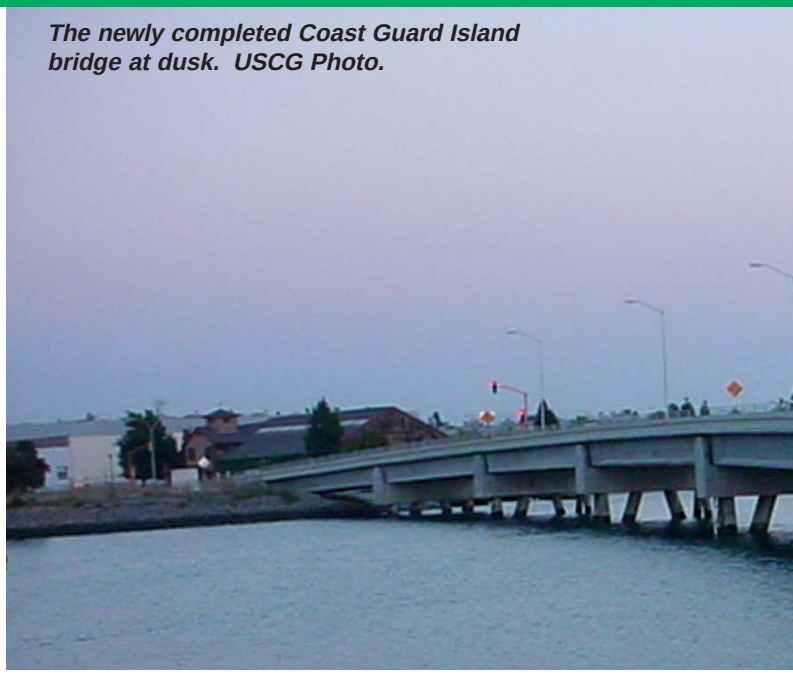
After

New east end bridge approach: New bridge added bike lanes and a wider sidewalk among other improvements. Photo by Moffatt & Nichol Engineers.

Care was taken to determine the full extent and cause of the problem and to make recommendations as to a repair methodology so that the original design capacity and durability would be reached. Because the California Department of Transportation (CALTRANS) has a different approach to staffing and administration of their projects, (i.e., larger construction teams and Quality Assurance staff), CALTRANS specifications allow the contractor to perform injection grouting of only the larger cracks. However, due to the depth and extent of the cracking and the lack of corrosion inhibitor in these areas, the agreed no-cost solution required that all the cracks be first filled to refusal with a Super Low Viscosity (SLV) epoxy and then apply a 50 mil epoxy binder broadcast overlay. A similar issue resolution process (testing, experts, etc.) was used when a large section of asphalt paving on the project was rejected due to excessive segregation of the mix.

The local utility company, which owns the gas service up to each individual building at ISC, worked out a plan, during the design phase, to temporarily relocate a portion of the main gas line feeding the Island. This was needed in order to allow completion of the new bridge and the new gas line routing in the sidewalk which was located on the southern side. Later, the company determined that their plan was unfeasible. Faced with several costly proposals, the team developed their own solution to place the line in the northern guardrail. This eliminated the need for a temporary routing and saved substantially over other alternatives as the contractor agreed that he could change the routing at no additional cost.

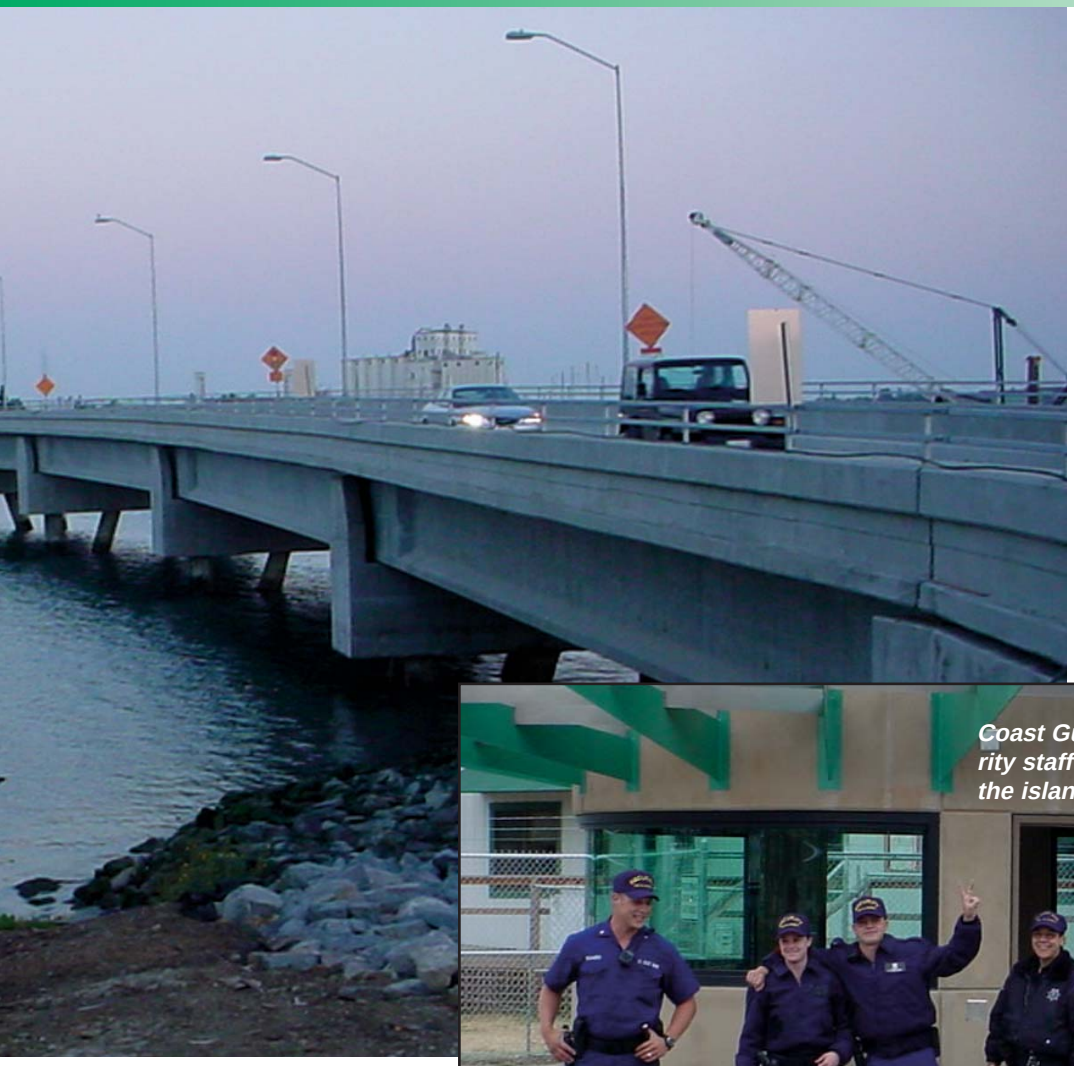
During the critical third phase, the contractor's rented 300-ton capacity spreader bar failed while lifting the last girder. The ensuing destruction of this 83-ton girder appeared to dash all hopes of limiting one-way traffic to 49 days and of completing the project on time. The project manager, construction inspector, structural engineers, and contractor simultaneously worked on two separate solutions. In the end, the team's preferred solution proved technically too difficult; however, since there was a backup plan in place, the project experienced no delay. A new girder was cast, one-way traffic was limited to 49 days, and the project completed ahead of schedule.



The newly completed Coast Guard Island bridge at dusk. USCG Photo.

Lessons Learned

- Best Value contracting can be used effectively as long as the proposed requirements are tailored to the unique circumstances of the project -- simply asking for past performance surveys on complex jobs is not enough.
- Partnering does work. A team properly focused on project goals can attain superior, even amazing, results.
- Whenever there is sufficient lead-time available to chase all permitting issues to the ground, all commitments need to be in writing from the right authority. This will eliminate errant interpretations by officials who lack the power to back up their commitments.
- When determining what a contractor's allowed work area will be, do industry research up front to determine the size of equipment typically used. This is particularly important if the government does not have automatic right-of-use to all or part of the area.
- Concrete batch plant tickets aren't worth the paper they are printed on. Admixtures that are not present can appear supplied as specified. Similarly specific admixture products can be miss-identified as something else. The only way to have any confidence in what is in the truck is by specifying that a team be present during batching to ensure the right product is on hand, in sufficient quantities, and getting in the mix. This team must have communication with the site so that unacceptable batches can be rejected prior to being placed. On large concrete jobs this is cheap insurance.



Coast Guard Island security staff welcome you to the island. USCG Photo.

Summary

Though some of our partnership goals proved to be a nine or ten foot bar, overall the project was still highly successfully by all accounts.

- The project was completed three days ahead of schedule.
- Total project cost was within three percent of contract award (less than the five percent goal).
- All disputes were resolved through equitable adjustment.
- The final punchlist had less than 20 items.
- The project was selected as a finalist for the 2002 SAME Design Excellence Awards.

In summary, the project was a win-win-win: for the Coast Guard, for both the Design and Construction Contractors, and for the taxpayer. All customer expectations were met. Impacts to operations and personnel were kept to a minimum. Strong engineering diligence and attention to details enabled AT/FP work, consequent to 9/11, to be done relatively painlessly. Budget and schedule expectations were exceeded. These accomplishments are the result of the efforts of all those that were involved -- not just the official project team. ISC Alameda's unit motto is: "The Bridge to Excellence." It's FDCC's hope that the project lived up to this motto by the actions of those involved, and in a real and physical sense.

For more project photos and information please visit our web site at: http://cgweb.pnw.uscg.mil/fdcc/projects/cg_island_bridge/33x3698.html.

- When using another agency's specifications, (in this case, because it was the industry standard, for the state), don't assume they expect the same level of quality as the Coast Guard, and if you want that level be prepared to pay for it.
- When dealing with a monopoly (a utility in this case), be prepared for them to change their minds. When asking whether or not they can actually do the work, you can never give them too much information.
- Incorporating pre-activity meeting minutes into a no-cost mod is a great way to avoid a contractor from changing his mind and coming back later looking for money.
- For projects requiring a great amount of coordination on multiple fronts, consider use of a project procedures manual to facilitate greater understanding and easier compliance by the contractor with coordination requirements.

Adding a Green Stripe

Natural Gas Use at Air Station Cape Cod: A Case Study for Effective Shore Facility Energy Management.

story by LCDR Jim Hurley and LTJG K.C. Cutler
R&D Center
photos by LTJG K.C. Cutler, R&D Center and
Dave Cleveland, Air Station Cape Cod

Air Station Cape Cod's aircraft tractor "mule" (bottom left) with newly converted natural gas powered engine demonstrates an environmentally friendly technology applied to aircraft support equipment. Top left an HH60 "Jayhawk" and top right an HU25 "Falcon."

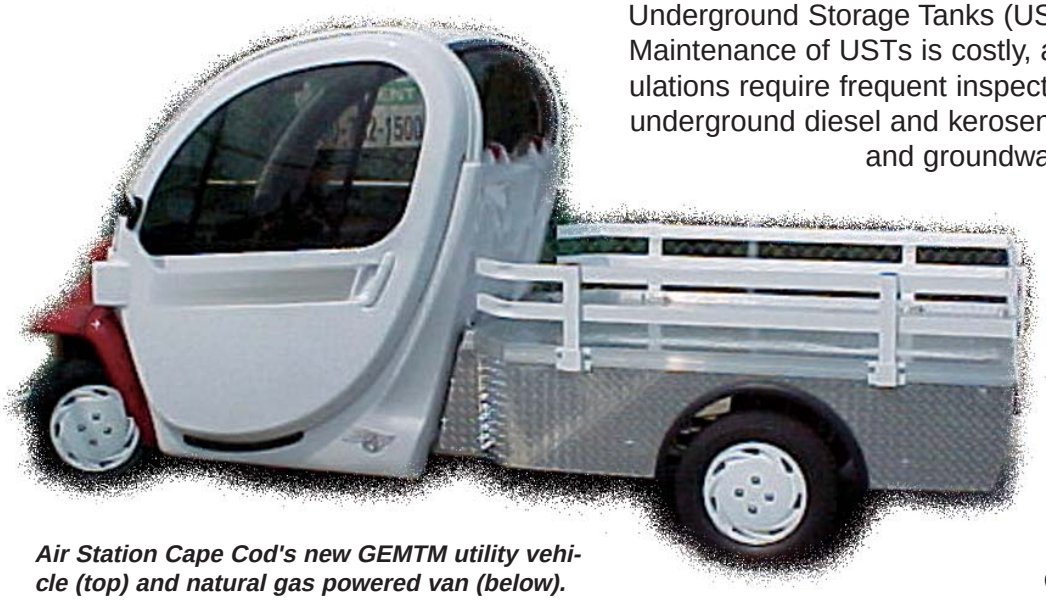
Overview

Like the rest of the United States, the Coast Guard is extremely dependent upon fuel oil for day-to-day operations. Vulnerabilities linked to this dependence, combined with environmental concerns and forecasted increases in oil prices, provide the Coast Guard good reason to consider alternative energy sources. One facility that has taken the lead in utilizing alternative energies, adopting both sound and progressive energy management practices, is Air Station Cape Cod. In seeking new technologies and innovative business practices, they have truly taken the energy management "bull by the horns" or it could be said, in looking at their aircraft tractor recently converted to natural gas, the "mule by the ears"!

Collaborating with the Research and Development Center, Air Station Cape Cod successfully adopted strategies to eliminate dependence on liquid petroleum, reduce energy use environmental impacts, and ease compliance with environmental regulations. As stated by Mr. Bob Cannon, Air Station Cape Cod's Facilities Energy and Environmental Manager:

"Natural gas provides us many benefits -- it has a very dependable local supply infrastructure, an attractive rate structure, and much more favorable environmental impact. Working closely with the R&D Center, we've been able to reduce implementation risks and share costs -- assisting us tremendously in reaching our energy management goals."

As recognized by Air Station Cape Cod, natural gas is an established energy source in the Northeast United States. Primarily composed of methane (CH_4), natural gas is the most hydrogen-rich hydrocarbon fuel and lacks most of the impurities found in diesel and gasoline. These qualities allow natural gas to burn extremely clean, nearly eliminating hydrocarbon, sulfur, and nitrogen compound emissions. This results in significant environmental and air quality benefits and allows machinery to be safely operated inside warehouses and hangars.



Air Station Cape Cod's new GEMTM utility vehicle (top) and natural gas powered van (below).

Another advantage of natural gas is the elimination of Underground Storage Tanks (UST) for liquid fuel storage. Maintenance of USTs is costly, as increasingly stringent regulations require frequent inspections and tests. Leaks from underground diesel and kerosene tanks can contaminate soil and groundwater. With the natural gas infrastructure, responsibility lies with the gas company to store fuel off-site, maintain fuel lines, and prevent leaks.

Air Station Cape Cod's and the Research and Development Center's efforts fall directly in line with the Coast Guard's overall energy management strategy. Commandant Instruction 4100.2D, Energy Management, affirms this in stating, "The Coast Guard is required by law to reduce its overall energy consumption and to minimize the use of petroleum fuel in all its facilities and platforms." The use of natural gas, a domestically abundant fuel, also places Air Station Cape Cod in line with the Commander in Chief's desire to reduce dependence on foreign oil. Further, the equipment and infrastructure used for natural gas is compatible with the President's recently stated ultimate goal of a hydrogen fuel powered economy.

While the cost of natural gas in many areas has risen considerably over the last few years, its cost remains competitive with diesel fuel and gasoline, and it has other advantages that can bring the life-cycle cost of a system down. In internal combustion engines, natural gas reduces combustion chamber deposits and burns so cleanly that oil change intervals can be extended to more than twice that of traditional liquid fuel engines. Additionally, with an octane equivalent rating of 130, dedicated natural gas engines can operate with much higher compression, which increases efficiency and power.

Air Station Cape Cod Strategy

Air Station Cape Cod Strategy

Air Station Cape Cod has taken significant steps towards reaping benefits of natural gas by enacting a comprehensive system-by-system conversion plan. Over the past several years, all building heating and hot water systems were converted to natural gas, two natural gas powered vehicles were procured through General Services Administration (GSA) contract, one compressed natural gas vehicle fueling station was installed, and an aircraft tow tractor was converted to natural gas. In converting building heating and hot

water systems to natural gas, the initial infrastructure outlay was significant. Approximately 14 miles of new natural gas pipeline was installed to provide service to 39 industrial boilers and 280 residential housing heating units.

This transition to natural gas eliminated most of the fuel storage tanks on base and drastically reduced emissions from base facilities. The clean burning systems also have reduced maintenance requirements and extended cleaning intervals. Flue deposits are nearly eliminated, reducing the need for flue cleaning and greatly decreasing the risk of flue fire.

Natural gas fired boilers provide clean and efficient space and hot water heating.

Next, the R&D Center contracted to convert a gasoline-powered, Pettibone-Tiffin, 8000-pound drawbar pull aircraft tractor, to operate on natural gas. The conversion was relatively simple, and accomplished by: installing a large Compressed Natural Gas (CNG) tank behind the seats, a small auxiliary CNG tank in place of the original gasoline tank, and an off-the-shelf electronic fuel injection system. The natural gas is injected directly into the air cleaner by a set of computer-controlled injectors. The only modifications made to the engine were removal of the choke assembly and fuel pump, and the addition of an oxygen sensor and exhaust manifold temperature sensor.

A laptop computer easily accesses the on board computer that monitors the engine and controls fuel injection. Using this computer, maintenance personnel can fine-tune the engine for optimal efficiency and emissions, and can also troubleshoot problems before attempting repairs.

The converted aircraft tractor was received by Air Station Cape Cod in March 2002 and has been in service without trouble since. The CNG tanks on the aircraft tractor are filled by a FuelMaker™ Model FMQ-2-36, contracted for installation by the Research and Development Center. After making proper connections, the unit operates unattended and can fill the empty tanks overnight. The tractor can then operate for approximately six hours on its main tank.

Air Station Cape Cod is currently installing two additional FuelMakers™ to support additional vehicles. They will soon be replacing their aluminum, walk-in, maintenance trucks with standard work vans operating solely on CNG. Although it will take two vans to replace the capacity of one walk-in truck, the cost of leasing two vans will be less than the cost of one walk-in truck due to current GSA lease rates. Additionally, in order to meet goals for use of alternative energy vehicles, the Coast Guard GSA Vehicle Fleet Management is considering covering the additional lease expenses associated with alternative fuel vehicles in Fiscal Year 2003 (FY03), which will make the CNG vans even more economical.

Natural Gas at Your Unit

Natural Gas at Your Unit

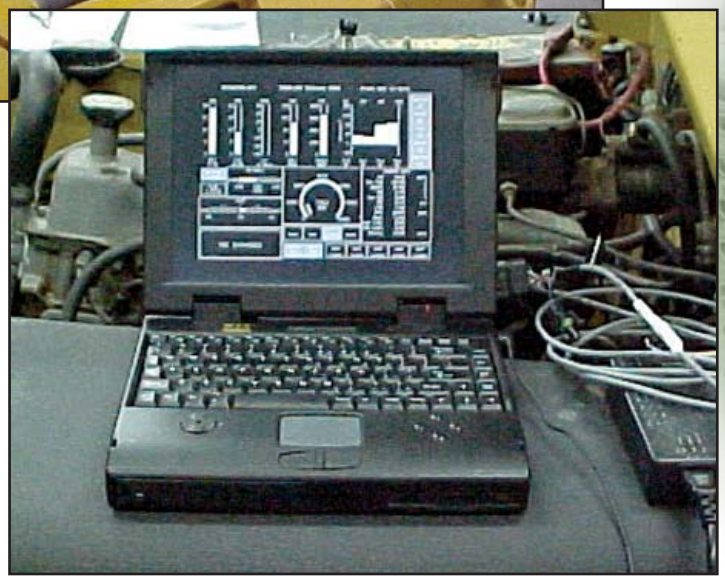
Other Coast Guard units may already have natural gas heating and hot water systems and operate bi-fuel vehicles (which can run on gasoline or CNG). Should your unit make a similar switch? There are a number of factors to consider.

Availability is one of the major factors. The Northeast United States is an area where natural gas is an established energy source and thus Cape Cod enjoys a reliable and ample supply. Other areas of the country do not have an extensive natural gas infrastructure. Units in these areas that are considering using natural gas should first determine whether the local supply infrastructure can support their requirements.

Reliability is another major factor to consider. Are the systems served crucial to the function of the unit? Is an interruption of service acceptable due to accident or other cause? While Air Station Cape Cod is dependent on a natural gas pipeline, they can still move, start, and fly aircraft without natural gas. Essential systems can be made bi-fuel, automatically switching to propane or fuel oil reserves if the natural gas supply is interrupted.

The *condition* of existing equipment needs to be considered as well. If equipment is relatively new, it may not make sense to replace it. But, if equipment is due for replacement, the natural gas fueled variety should be considered.

As mentioned previously, the cost of natural gas, while still competitive with fuel oil in many areas, has risen in recent years. However, units may still realize cost benefits in the form of reduced maintenance and relief from UST regulatory requirements. Air Station Cape Cod has been able to remove all USTs, which has



Natural gas powered aircraft tractor with rear mounted main natural gas tank and computer diagnostic equipment.

resulted in a major cost savings. Cost savings can also be realized if equipment can be operated on either natural gas or liquid fuel ("bi-fuel" capable equipment). In this case, if the user is willing to accept the possibility of an interruption in service from the gas company (in times of extreme high demand or low supply, usually by maintaining a small supply of liquid fuel), the gas company may offer an "interruptible" rate at considerable savings over the regular rate.

The removal of USTs and the conversion to natural gas also has major environmental benefits. Without liquid fuel storage tanks, there is no chance of a fuel spill and no chance of soil or water contamination. Also, the emissions from natural gas systems are significantly lower than any liquid fuel system, keeping the air clean at your unit. This is particularly helpful for units located in areas where air pollution levels persistently exceed the national ambient air quality standards and are designated by the Environmental Protection Agency (EPA) (under the Clean Air Act of 1990) as "non-attainment" areas.

Ultimately, the use of natural gas has the potential to improve the environment, reduce our dependence of foreign oil, and prepare us for the hydrogen economy of the future. It is an alternative energy that should be considered by the entire Coast Guard. When it makes sense both economically and logistically, use of natural gas should be expanded. If you have questions or are considering natural gas for vehicles or facilities, please contact the R&D Center, Air Station Cape Cod, or your local Civil Engineering Unit.

Fill'er Up! Mr. Luiz Ferreira of Air Station Cape Cod shown filling aircraft tractor fuel tank at FuelMaker™ natural gas filling station.

Completed Air Station Detroit facility.

Innovated Fast-Track Construction Process Produces

"Right Facility, Right Place, Right Time, Right Cost"

by CDR Stan Douglas
Facility Design and
Construction Center Atlantic

In May 2002, Coast Guard Air Station Detroit held a ribbon cutting ceremony for a $3.6M operations hangar, standing up a new Air Facility (AIRFAC) for the region. This new 22,000 square-foot facility contains offices, shops, duty berthing, and a two port helicopter bay.

The Facilities Design and Construction Center Atlantic (FDCCLANT) in Norfolk, Virginia, is responsible for executing this major project in the Coast Guard's Acquisition, Construction, and Improvement (AC&I) shore program. FDCCLANT is routinely involved with executing capital improvement projects like this for the Atlantic Area region and these projects normally take four to five years to plan, design, bid, and construct. However, a unique set of circumstances compressed the allowable schedule for this project and challenged FDCCLANT to complete the process in less than two years. Reasons surrounding the need to expedite the completion involved a congressional mandate and expiring AC&I funds. Fortunately, praise worthy project execution was achieved. But how was this done and what procurement strategy did the unit use? Through hard work and a determination to succeed, a dedicated team developed an innovative solution to an unforeseen situation. By adjusting the Coast Guard's AC&I shore project development processes, adopting a fast-track Design/Build (D/B) approach, and using the General Services Administration (GSA) Federal Supply Schedule, FDCCLANT accomplished this task in flawless fashion. This article tells the story of the techniques and procedures used to accomplish this noteworthy effort.

PROJECT BACKGROUND

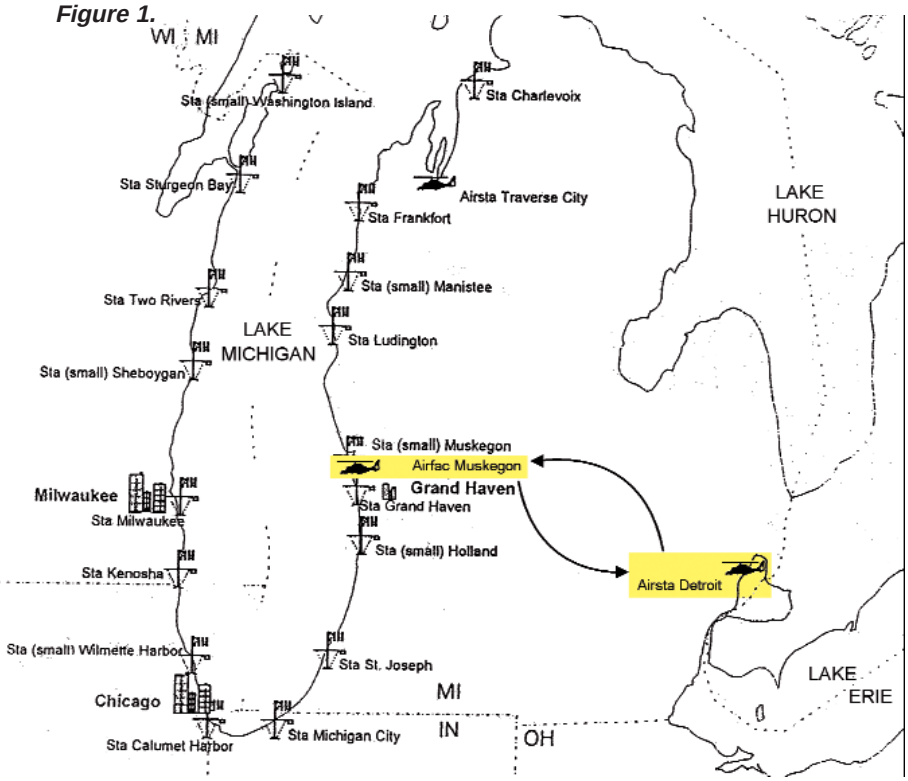
In 1997, Congress was concerned about the lack of air coverage in the Michigan area and asked the Coast Guard to study this issue. The Coast Guard study identified a need to establish a new AIRFAC to provide air coverage for the metropolitan Chicago area. This AIRFAC would operate from its parent facility located at Coast Guard Air Station Detroit. Construction of a new

Top Photo: VADM James Hull, current LANTAREA Commander and former Ninth CG District Commander, was guest speaker at the Ribbon Cutting Ceremony.

Bottom Photo: From left to right - Bill Clark of Quadrant Inc.; Randy Stock,VP Bucon, Inc.; VADM Hull; and CAPT Dave Spillman, AIRSTA Detroit CO, unveil facility plaque.

aircraft hangar in Detroit would be necessary to stand-up the new mission. Air Station Detroit is a small, three-helicopter air station located on Selfridge Air National Guard Base (SANGB) on the eastern side of the Michigan's Lower Peninsula between Lakes Huron and Erie (Figure 1). A Coast Guard Staffing Study indicated 39 new billets and an 11,000 square foot hangar facility would be required to support the AIRFAC. Information from the study formed the basis of a December 1998 AC&I Planning Proposal, which approved the project for further development (but sat dormant). However, in September 2000 this Planning Proposal became part of an $11.8M Congressional Appropriations insert, placing the project in the Fiscal Year 2000 (FY00) budget cycle. The insert mandated the Coast Guard acquire two airframes and construct a new supporting operations hanger. For Team FDCCLANT (assigned the project in June '00) this meant design and construction of an unanticipated hangar facility, at a set $3.6M budget in the FY00 funding cycle. Under the normal AC&I timetable, engineering design, construction plans, and specification would be completed and construction would be underway by now. However, in this case, the required AC&I project-development nor engineering plans and specifications were completed … or even started at this point. According to the AC&I Strategic Calendar we were three years behind in the planning and design cycle, one year behind in the construction cycle, and only had two years left to obligate the money (YIKES !!!)

Figure 1.



THE DESIGN/BUILD APPROACH

Ultimately our execution strategy for this project would be to embrace a Design/Build (D/B) method of delivery. There are specific distinctions between D/B and the traditional Coast Guard construction processes. Traditional Coast Guard construction projects typically follow a path similar to the illustration in Figure 2.

D/B is an alternative to the traditional Design / Bid / Construct method of project delivery. D/B places primary emphasis on integrating the design and construction phases of a project (Figure 3). D/B contracting provides the owner with a single point of responsibility for both design and construction. It is a Team approach from project inception, which provides more effective cost management, scheduling, and quality control. D/B offers phased-

Figure 2.

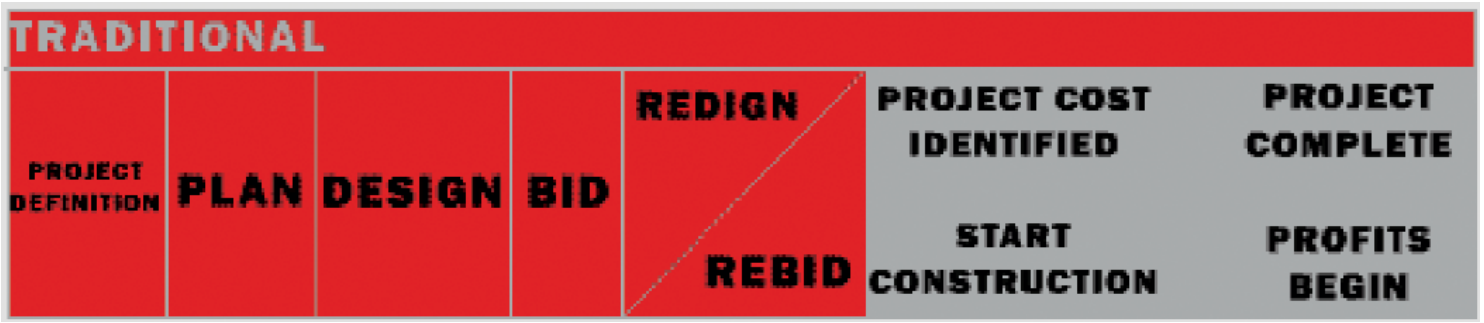


Figure 3.

construction, and can save three to six months over the traditional approach. This timesaving is realized primarily because certain components of the construction process can be initiated and completed while design work is underway. Examples of this are permitting, site work, and the ordering of essential materials such as steel.

This method provides the owner with the flexibility to fit the contracting method to the specific project requirements. But most importantly, the Design / Build method of construction provides the owner a high quality, fast track product while allowing the utmost in owner input.

GSA PROCUREMENT AS A SOURCE OF SUPPLY

Responding to this challenging project dilemma required research and quick determination of a reliable D/B alternative. Initially the General Services Administration (GSA) was viewed as an unlikely medium for executing a $3.6M major construction project. Even though for years GSA has earned a good reputation as an adaptable provider of a number of services to the federal government, the possibility of using this delivery source was debatable. Most GSA contracts are for standard services, "Commercial-off-the-Shelf" (COTS) products, and equipment. However, to our surprise there were companies on the schedule that provided pre-engineered buildings and components, along with the ancillary design, construction, and inspection services for facility erection. Committing to this available acquisition alternative was our best course of action. Knowing that the GSA procurement strategy would eliminate much of the work involved with the traditional processes was appealing and eventually endorsed by the staff. So the approach was set, but before moving forward, AC&I documentation had to first be generated, submitted, and approved.

PPRA DEVELOPMENT AND RIGHT-SIZING THE FACILITY

Since funds were already identified, it was determined that at least a Project Proposal Report - Part A (PPRA) would be completed to satisfy AC&I documentation requirements. The PPRA is the AC&I conceptual package based on 10 to 15% design of the actual facility, it considers all the necessary project elements such as, site improvements, major building components, building utilities, and environmental requirements to accomplish the project. Having the Planning Proposal (PP) essentially used as the project budget and scope-setting document was inappropriate and is not the way the system is supposed to work. This action locked the Coast Guard into a situation for potentially constructing an inadequate facility, short on size, incomplete, and functionally poor. Responding for quick resolve here, Team FDCCLANT prompted a series of meetings with the appropriate stakeholders to determine the exact size of the facility. The proposed facility, based on 39 new billets, was too small. According to Coast Guard spacing standards a 22,000 SF facility was an appropriate size for the proposed hangar. Additionally, FDCC actual cost data of previously built facilities indicated that $3.6M would only buy a 17,000 SF facility, at best. Subsequent work with Air Station Detroit staff, the District 9 (D9) Planner, and Commandant (G-ACJ) personnel essentially determined the arrangement of functions that could work in a 17,000 SF space. This procedure assured us we would at least provide a feasibly functional facility for the available funding. Consequently the concerted effort forced a reasonable consolidation of like-functions into shared space, producing a 17,000 SF building that adequately supported mission requirements. The noted remaining additional 5,000 SF, as per Coast Guard standards, consisted of additional classroom and training space, along with one extra duty berthing

Figure 4a. FLOOR PLAN (FIRST LEVEL).

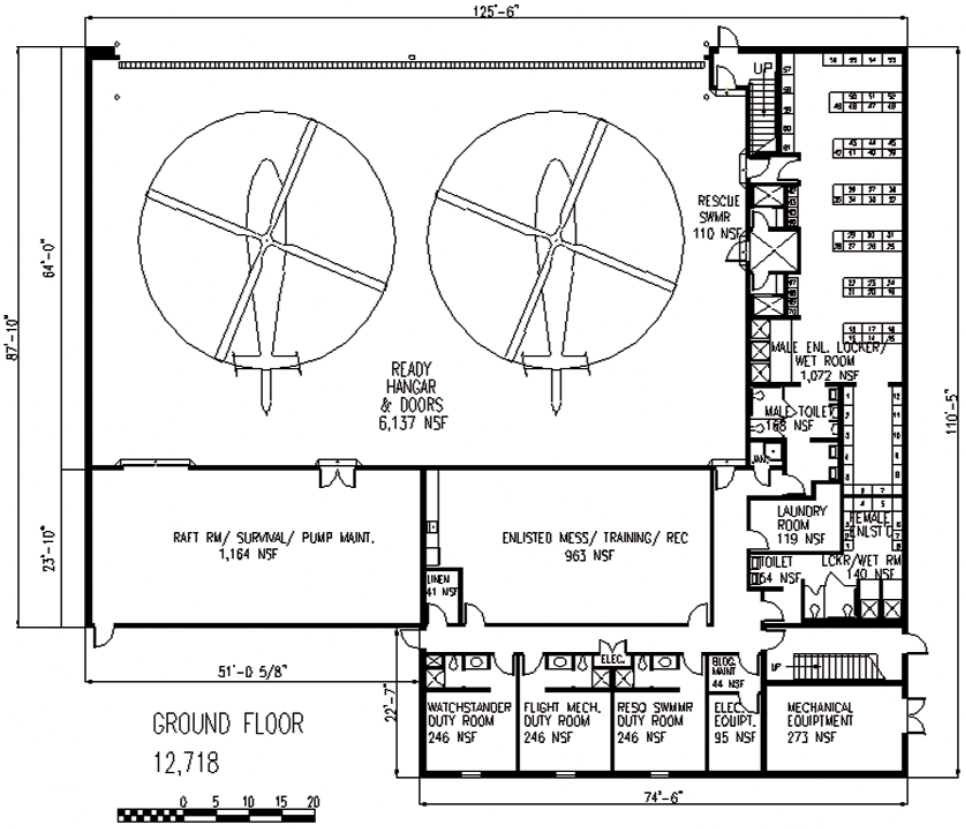
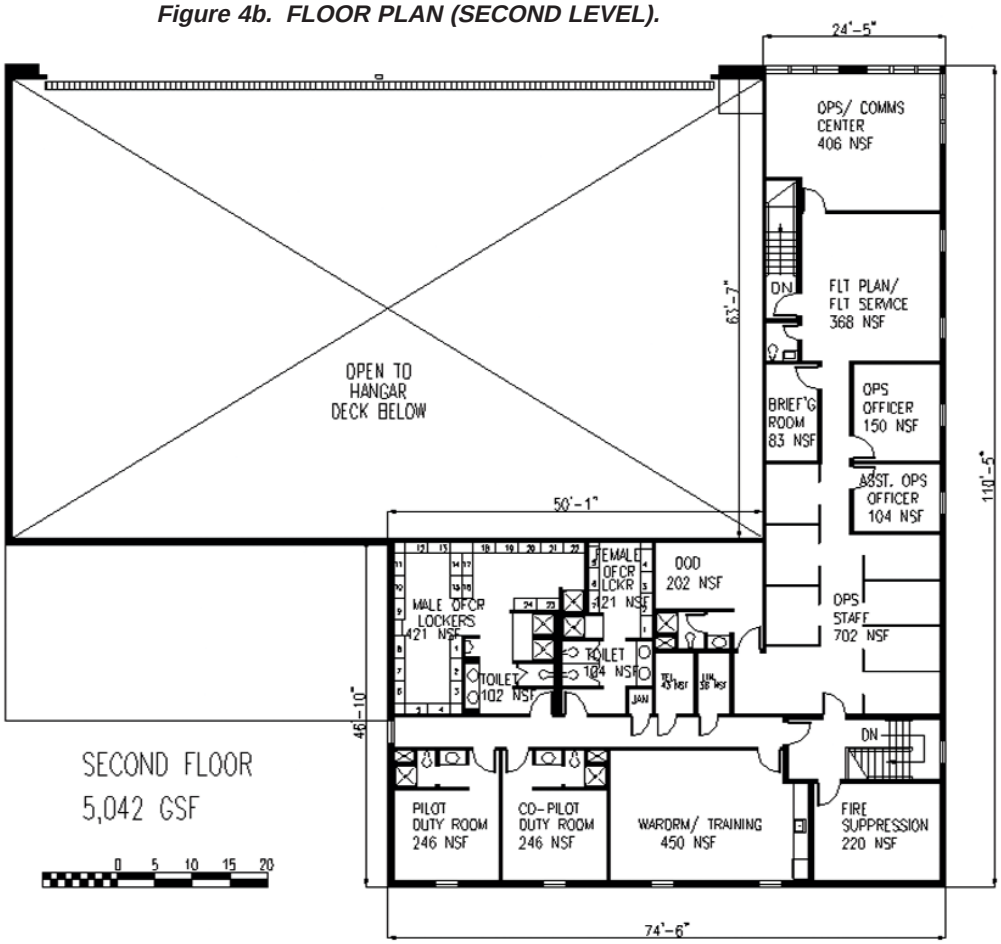


Figure 4b. FLOOR PLAN (SECOND LEVEL).



room. Eventually these residual spaces were made available through a customer requested change, after the contract was awarded. Remaining PPRA support requirements were effectively coordinated with CEU Cleveland and the host Command.

With an aggressive coordination and meeting schedule, we completed the PPRA in three months and also received approval for the D/B approach on 20 December 2000. Because of D/B, no further AC&I documentation would be required (i.e., the PPRB and the 100% design package). Figures 4a and 4b shows the floor plan layout for the facility provided in the PPRA.

GSA PROCUREMENT PROCESS

Procurements from the schedule closely resembled commercial buying practices, which involved a two-step approach. Figure 5 illustrates this process.

First we were afforded the opportunity to do market research for pre-engineered building contractors on the schedule. This process involved inviting these contractors to the project site for an informational meeting. Included in our invita-

tion letter were gross square footage requirements, overview of space usage intent, and preliminary program information. This meeting was non-binding and allowed information sharing, which also provided us with a sense of confidence that this approach would be successful and allowed us to develop good project budget numbers.

Concerned that Butler Construction out of Kansas City, Missouri, was the only contractor to accept our invitation, we contacted each of the other contractors to verify receipt of the invitation and discuss project details. Each of the contractor's contacted declined our invitation due to the size of the project. It was determined based on our market research and responses from the other GSA Schedule contractors that Butler was the only contractor interested in our project. Therefore, they would be the only contractor sent a Request for Quote (RFQ) package containing a performance-based statement of work. Award would be based on our determination of price fair and reasonableness in lieu of best value determination among the various GSA contractors.

Our PPRA could have easily been used as the RFQ performance-based package, which is nearly the same information. However, the unit did not feel comfortable taking the risk using only a PPRA on this $3.6M project. Therefore the PPRA concept package was enhanced. Producing the performance-based engineering design and spec package in an abbreviated version (Division - 01) of the typically used Construction Specification Institute (CSI) format, as shown in Figure 6. This insured certain Coast Guard requirements were incorporated in the project and also reiterated the contractor's need to comply with industry standards and applicable building codes.

Butler was given 30 days to submit a cost proposal once they received the

Figure 5.

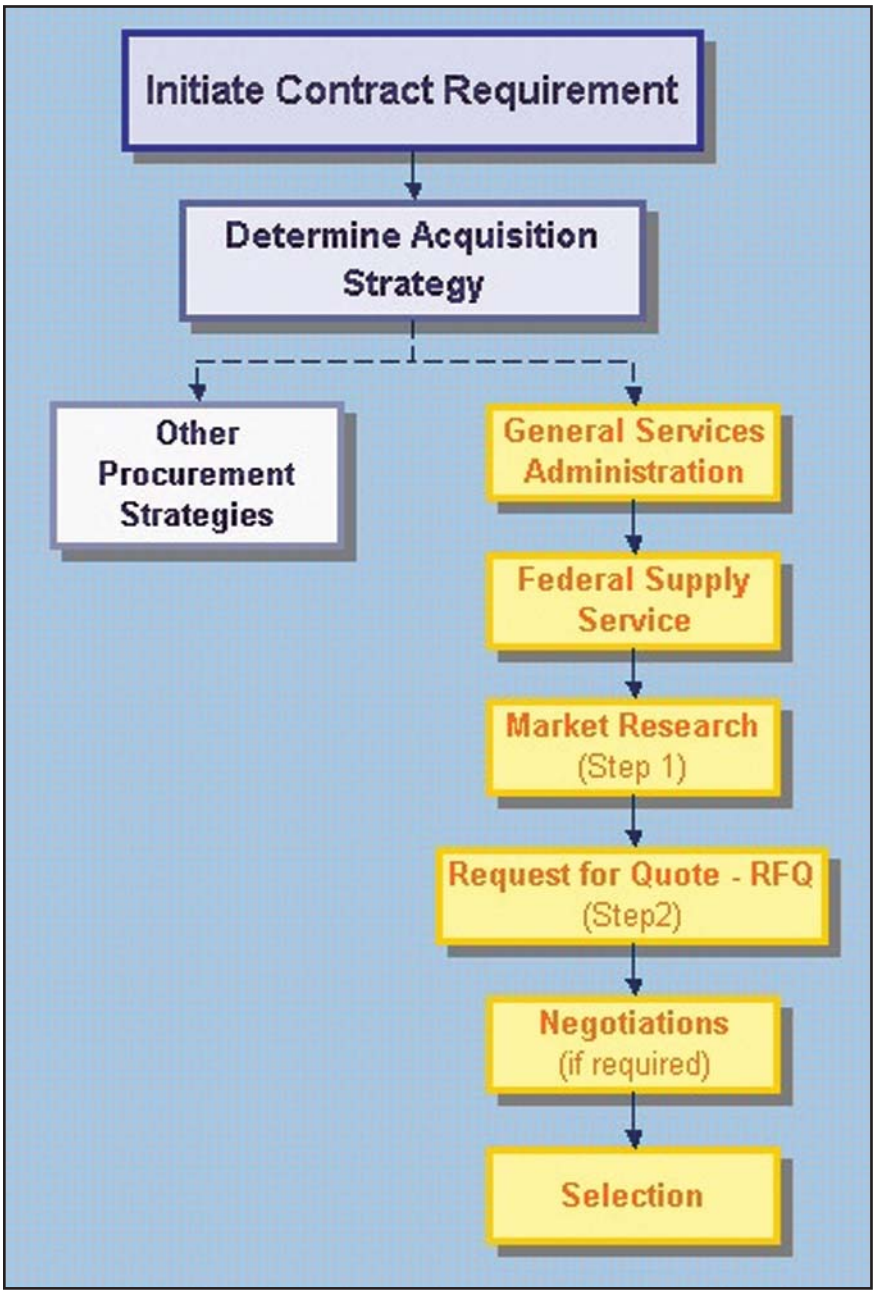


Figure 6. Performance Spec Outline.

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Figure 7. The D/B Team.

Design/Build Team	
Engineering:	Butler Construction, Kansas City, Missouri
Architect:	Foresta Group, Farmington, Michigan
Constructor:	Quadrant, Inc., Wixcom, Michigan
Customer:	FDCCLANT, Norfolk, Virginia.
User:	AIRSTA Detroit, Michigan

Figure 8.

Project Schedule	
Project Start	June 01, 2001
50% Design	July 24, 2001
100% Design	August 8, 2001
Construction Start	July 23, 2001
Construction Completion	March 01, 2002

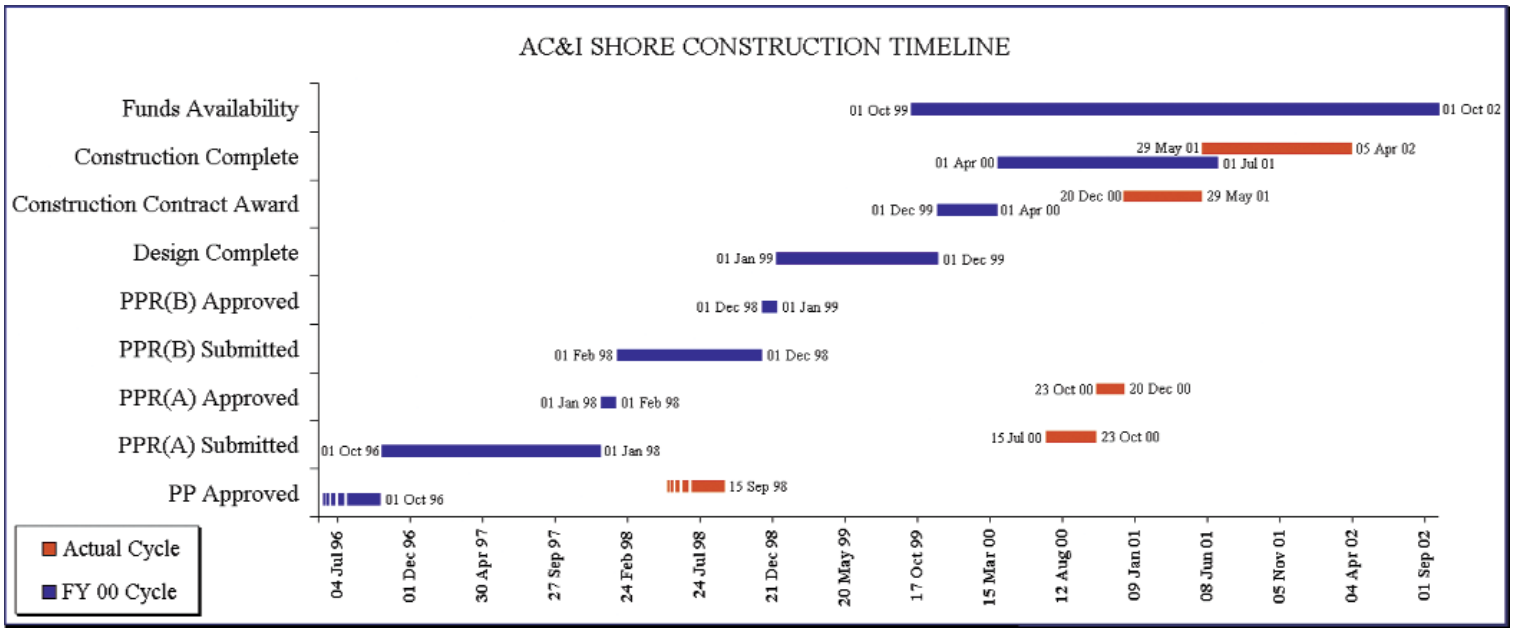
Contract Award Amount (Base Proposal - 17,000 SF) - $3,412,360.00
Plus Interior Finish of 5000 SF (Optional item)

RFQ package. Under GSA rules of procurement, negotiations were allowed on the final submission. Prices eventually were determined to be fair and reasonable, and contract award was made. This entire procurement process took about 45 days compared to 425 days required for traditional construction procurement (60 days required to advertise and nearly one year for design). With the contract awarded, construction schedules and projected completion dates were set and this fast-track construction project was ready to roll. The D/B project team members were set and are listed in Figure 7.

FAST-TRACK PROCESS

To meet the demanding project timetable, typical oversight associated with a federal government construction projects had to be scaled back. Butler's fast-track construction approach allowed little room for submittal design and construction review. Making this change in the design and construction process was a cultural shift for the unit, but was necessary and significant in meeting the desired project schedule. Although this fast-track approach placed total design and construction responsibility on the contractor, we still wanted some validation of the delivery process. So as part of the contract requirements, the contractor provided design submittals, for information purposes and also allowed inspection of construction work at key milestones. This permitted us to document, for the record, any items that appeared not to be in conformance with standard engineering

Figure 9.



practice. Also, the contactor was required to provide a full set of as-built drawings once the project was completed. After all negotiations were complete, final contract prices and the delivery schedule were established (see Figure 8).

CONSTRUCTION AND DESIGN

Once construction started, the work moved along quickly. Field activities were like any typical construction project of this type, with the exception of having some of the work start before engineering design was complete. The contractor followed the approved construction schedule and provided us with the required deliverable as noted. However, losing some control over the design and construction process was a "tough pill to swallow" for our project team. Relying on the contractor and his designer to deliver a quality product was a major adjustment from the traditional philosophy, but in the end proved to be favorable. The entire project execution process took less than two years, with design and construction taking only 10 months. The D/B timeline compared to the AC&I cycle shows the time made up and saved using this alternative (Figure 9).

Overall, the approach proved to be an extremely reliable and cost effective construction method. Compared to traditional design and construction, the errors and omission change order rate was nearly zero compared to our typical one-and-a-half to two percent. All other major changes were customer driven. These items included relocating and expanding the parking lot to satisfy building buffer zone requirements as a result of 9/11. These changes also included the 5,000 SF build-out of additional space, initially discarded during the project development process.

Project Site @ Construction Start.


Start of west side construction framing.

Steel framing of entire structure.

View from northwest side, under construction

Siding installation, east side.

New facility and apron extension.

CONCLUSION

The GSA D/B procurement system approach is a fantastic tool to have in your "construction acquisition tool bag." Since completion of the hangar facility this procurement method has been fine-tuned and used for several other projects. Projects such as contract award for the $12M Engineering Logistics Center (ELC) Warehouse Consolidation project, as well as a $20M Aircraft Repair and Supply Center (AR&SC) hangar conceptual package proposal are just a few examples. This process also paved the way for other rapid procurement methods such as awarding our first Indefinite Quantity Delivery (IDIQ) D/B construction contract near the end of FY02. As the Coast Guard transitions into a new department and also enters the DEEPWATER era, the need for rapid facility construction is apparent. The GSA D/B approach significantly reduces the normal time-consuming government procurement process and requires fewer resources to execute. With this and other quick delivery procurement strategies, FDCCLANT stands ready to meet the future facility procurement demands of the Coast Guard and the Department of Homeland Security.

References:

1. Diagram courtesy of Hale Building Company LLC, Wilmington, N.C.

VADM Hull tours facility interior spaces.

AN INNOVATIVE APPROACH TO DESIGN-BUILD MULTIPLE AWARD CONTRACTS

by Phil Gillihan and
Patty Kellihan
Facilities Design and
Construction Center Atlantic

The following innovative approach to meeting customer needs illustrates the Head of Contracting Activity's goal to have our contracting professionals act as strong team partners and business advisors. The contracting strategy involves tenets from acquisition reform, sound business principles, and support for our socio-economic programs, minimizes procurement lead time, and provides for fall back strategies should the prices be unreasonable. FDCCLANT's methods should be looked at as a model for others in supporting their program manager's needs.

Richard Freethey
Chief, Office of Procurement Management

THE NEED FOR FLEXIBLE ACQUISITION TOOLS

Executive agencies utilization and perceived misuse of task order contracts has come under increasing criticism from regulatory bodies, industry, and the acquisition community. This has led to regulatory restrictions and increased scrutiny on the use of task order contracts and arguably an erosion of the immunity from protest. Notwithstanding the controversy, task order contracts in all their various iterations can provide agencies incredible flexibility in attaining all the varied and sometimes conflicting goals inherent in federal procurements. The trend in the federal government to privatize commercial activities will likely place an increased premium on the use of innovative and flexible contracting approaches. Whether the privatization is accomplished by outright A-76 type competitions or through agency reorganization, the procurement burden on the

so-called residual government organization will increase dramatically. If present trends continue, those with procurement and technical project management skills whose function is to define, interpret, and fulfill agency requirements through a large cadre of supporting contractors, will increasingly populate the federal workforce.

With so much of the government's business being accomplished under contract and with fewer skilled personnel to oversee those contracts, there will be a premium on flexible and effective contracting approaches. The task order contract, perhaps more than any other contract vehicle, will offer the residual government organizations the flexibility required to manage the largely contract based business of government. Notwithstanding the criticisms, creative, and thoughtful use of the task order type will not only meet the business needs of the government, but at the same time achieve the broader goals of the federal procurement process.

Recently, the United States Coast Guard's Facilities Design and Construction Center Atlantic (FDCCLANT) awarded a task order contract illustrative of the point. FDCCLANT is one of the new breed of government organizations that has evolved from service provider to project management group. FDCCLANT is responsible for the design and construction of Coast Guard shore facilities in 40 states and Puerto Rico. In contrast to years past, however, the designers and architects produce very few completed designs and construction management is increasingly performed under contract. The design and engineering work preformed by FDCCLANT personnel is provided almost entirely in connection with the interpretation and definition of Coast Guard shore facility requirements on the one hand, and technical oversight of various construction, design, and increasing number of hybrid design build contracts on the other.

OBJECTIVES OF THE NEW APPROACH

The evolution of FDCCLANT from a commercial provider to acquisition and project management group has obviously placed increased burden on the procurement process and workforce. Central to the FDCCLANT business plan was to develop the capability to award more contracts at a greater dollar value in a shorter period of time, without sacrificing cost or quality. It is probably out of such an environment of expediency that fundamental precepts of government procurement are sometimes sacrificed. FDCCLANT's procurement staff is well aware of the potential for misuse, however, and realized that to be truly successful the contractual approach had to be responsive to the important goals of the federal procurement process while still meeting the needs of the U.S. Coast Guard. FDCCLANT procurement and technical staff at the outset identified the important objectives to be met and from this benchmark crafted a contract vehicle designed to achieve these objectives:

1. Building strong partnerships with contractors through the probability of repeat business.
2. Support and preservation of the small business program.
3. Speed, efficiency, and flexibility in the award of individual tasks while ensuring price reasonableness and quality.
4. Minimizing the cost of proposal preparation among awardees while preserving the competitive environment.
5. Providing an opportunity for contractors to be rewarded for outstanding performance through an award term arrangement.
6. The contract tool must provide a viable win-win situation for all parties.
7. Alignment with the Commandant's themes of readiness, people, and stewardship.
8. Alignment with the civil engineering program's goal of right facility, right place, right time, and right cost.

These objectives could be contradictory if each is pursued to the exclusion of the other. The task order vehicle, more than any other type, provides a tremendous number of entry points where sometimes conflicting goals can be harmonized. With attention to size, scope, and available dollars, a multiple award approach among the "right" number of awardees can provide the real expectation of financial reward to all awardees. The use of award terms in conjunction with the task order vehicle can foster long term relationships with awardees interested in delivering quality service at reasonable prices. Perhaps most importantly, the Federal Acquisition Regulation allows tremendous flexibility in the tailored competitive award of tasks without the crushing burden of full-blown proposals and reams of paperwork.

IMPLEMENTATION AND AWARD OF MULTIPLE AWARD CONTRACT METHOD

This thought process led to the implementation of a contracting method that would streamline acquisitions, motivate contractors to improve and sustain outstanding performance, and build long-term business partnerships with contractors. The decision was made to execute a multiple award indefinite-delivery, indefinite-quantity award term design/build construction contract. The contracts are for design-build and design-bid-build construction and repairs and alterations for the U.S. Coast Guard throughout the 50 states within the United States. An award term contract offers the flexibility for contractors to make good business decisions over time based on their financial investments, and offers an incentive system for a long-term relationship. Since this was to be an award term contract, the period of performance was established for a base period of three years with the opportunity for exercising seven additional one-year terms. The award term contract rewards contractors for outstanding performance by extending contract duration.

One of the most widely publicized criticisms of the large task order contract is the elimination of opportunity for small and small disadvantaged businesses. Market research indicated that small businesses and 8(a) contractors would be able to compete in this environment. FDCCLANT believes that the evolution of the construction and design industries over the past few years has demonstrated that small construction and design-build firms could successfully enter the multi-state arena. Research with the regional office of the Small Business Administration indicated there would be viable competition; therefore, the contracting officer restricted the contract to the 8(a) program contractors. These are socially and economically disadvantaged contractors based on the program in accordance with Section 8(a) of the Small Business Act.

In conjunction with acquisition strategy decisions concerning type of contract and socio-economic restrictions, the method of procurement had to be determined. FDCCLANT wanted contractors that were highly qualified with competitive prices. The source selection process was based on best value utilizing price, past performance, and experience in design/build construction as evaluation factors. This resulted in a vast amount of competition from numerous capable sources. Through execution of the source selection process and compliance with the solicitation requirements, it was determined that two firms represented the best value to the government. The number of awardees was limited to two based on forecasted budgets and number of projects. The overriding goal was that each awardee have a reasonable expectation of receiving substantial business. The result was a multiple award to two 8(a) contractors.

TASK ORDER SELECTION PROCESS

The task order selection process was designed to dramatically streamline project award. When new project requirements are initiated, a decision is made on whether the circumstances warrant price only quotes or oral presentations and a streamlined best value approach. As a general rule, smaller and well-defined projects typically are awarded based solely on price competition. Award selection for larger and more complex projects are based on oral presentations and a best value approach that includes evaluation factors such as cost estimate, technical approach, schedule, and other unique requirements specific to the job. Every effort is made to limit oral presentations to one hour with little or no written submittals. Cost is an evaluation factor in every competition. The contractors' initial cost proposals are only estimated prices based on quotes from subcontractors and estimate of in-house costs. However, the winner's final proposal must be within 10% of the initial proposal if they are awarded the task order. The real advantage to the contractor is they are not required to provide a detailed cost estimate and incur proposal preparation costs for all projects. They will only expend the effort and provide written detailed proposals when they are being slated for award.

Once selection of the contractor is made as a result of oral presentations, a request for proposal is issued. The contractor provides a detailed cost proposal, negotiation occurs to finalize the price, and an award is made. If negotiated agreement cannot be reached, the acquisition strategy is re-evaluated. The government is under no obligation to make award to the contractor that was initially slated for award if agreement cannot be reached. The government reserves the right to utilize other contracting avenues or the other 8(a) firm if price is unreasonable. As long as both contractors are treated

fairly and receive equitable amounts of work, the business arrangement is a win-win for all parties.

CONTRACT ADMINISTRATION RESPONSIBILITIES

The FDCCLANT acts as the Administrative Contracting Officer and performs all contract administration duties for the task order contracts. This encompasses contract modification, inspection, payment, contract interpretation, and resolution of contract issues and potential claims. This is made easier due to contractors being considered part of the team and working to achieve common goals. The pool of talent, experience, knowledge, and innovative potential has been a major advantage. This has proven to be a collaborative relationship that allows the government to effectively perform risk management.

CONCLUSION

This approach has greatly reduced staff administrative burden and streamlined acquisition processes for FDCCLANT. Clients are receiving prompt service and the approach allows FDCCLANT the flexibility to work more effectively and efficiently to meet critical mission requirements within funding limitations. The time needed to execute contract task order awards ranges from one week, for urgent requirements, to a month or more, for complex requirements. This allows greater flexibility in managing workload and the ability to be better prepared to take on occasional unforeseen and urgent requirements.

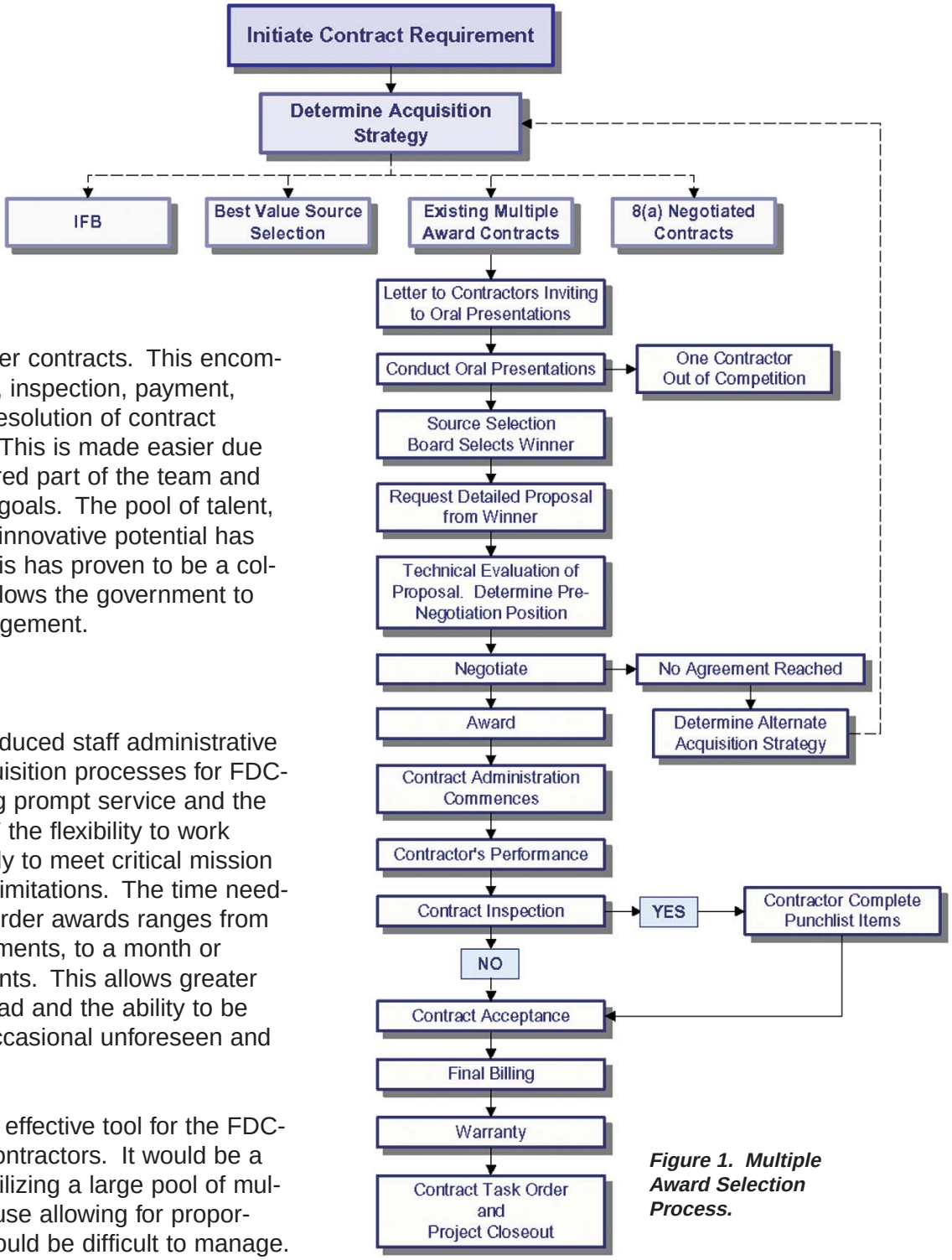


Figure 1. Multiple Award Selection Process.

This has proven to be a very effective tool for the FDCCLANT and the task order contractors. It would be a far less effective approach utilizing a large pool of multiple award contractors because allowing for proportionate shares of the work would be difficult to manage. With a large pool of contractors, the objective of equitable distribution of the work will not be feasible. It would be more difficult to build long lasting partnerships with a large number of firms, which is one of the greatest advantages to the FDCCLANT approach. The effectiveness would be destroyed if the actual task order selection process degenerated into a proposal writing contest. Reducing proposal preparation costs, in terms of both time and money for all parties, allows the use of hybrid design/build contracts at a much lower dollar threshold than previously thought possible for this type of contract. This has enabled FDCCLANT to transform current procurement practices to mirror commercial industry practices without sacrificing compliance of federal laws, statutes, regulations, and acquisition policies. As a result, this acquisition and project management organization has been able to eliminate some government inefficiencies while preserving procurement integrity and safeguarding the taxpayer dollars.

Governors Island Property Disposal

by Jay Phillips, P.E.
Maintenance and Logistics Command Atlantic

Governors Island

A bird's eye view of New York City and Governors Island (pre 9/11).

On 30 September 1997, the last operational command on Governors Island (GI) was disestablished. A Caretaker Detachment (CAREDET) was established to provide protection and maintenance services until the General Services Administration (GSA) could dispose of the property. Around this time, the Balanced Budget Act of 1997 was passed, which stipulated that GI could be sold no earlier than Fiscal Year 2002 (FY02), and provided the State and City of New York the right of first offer for GI at "fair market value." It looked like the Coast Guard and GSA would be responsible for GI for a long time! GSA has fully funded the Coast Guard for all protection and maintenance costs since FY99, including salaries for CAREDET personnel, under the authority of 41 CFR §101-47.402.

GSA had started to work with the City and State of New York on the sale of GI, when the tragic events of 9/11/01 occurred. CAREDET personnel rose to the occasion on 9/11, with GI firefighters assisting at ground zero, and the crew making the island ready for staging of National Guard troops for over a month. Of course, with much greater concerns requiring attention, the discussion regarding the sale or transfer of Governors Island was shelved.

When discussions resumed with the State and City of New York for the sale of GI, they came to the table with a new concept. They wanted to develop GI for primarily educational and public use, which would drive the fair market value of the property down to a minimal level and facilitate the transfer of the property under the Title 41 property disposal regulations and the Balanced Budget Act of 1997. There was also a proposal for Castle William and Fort Jay to be designated as a National Monument and be transferred to the National Park Service (NPS).

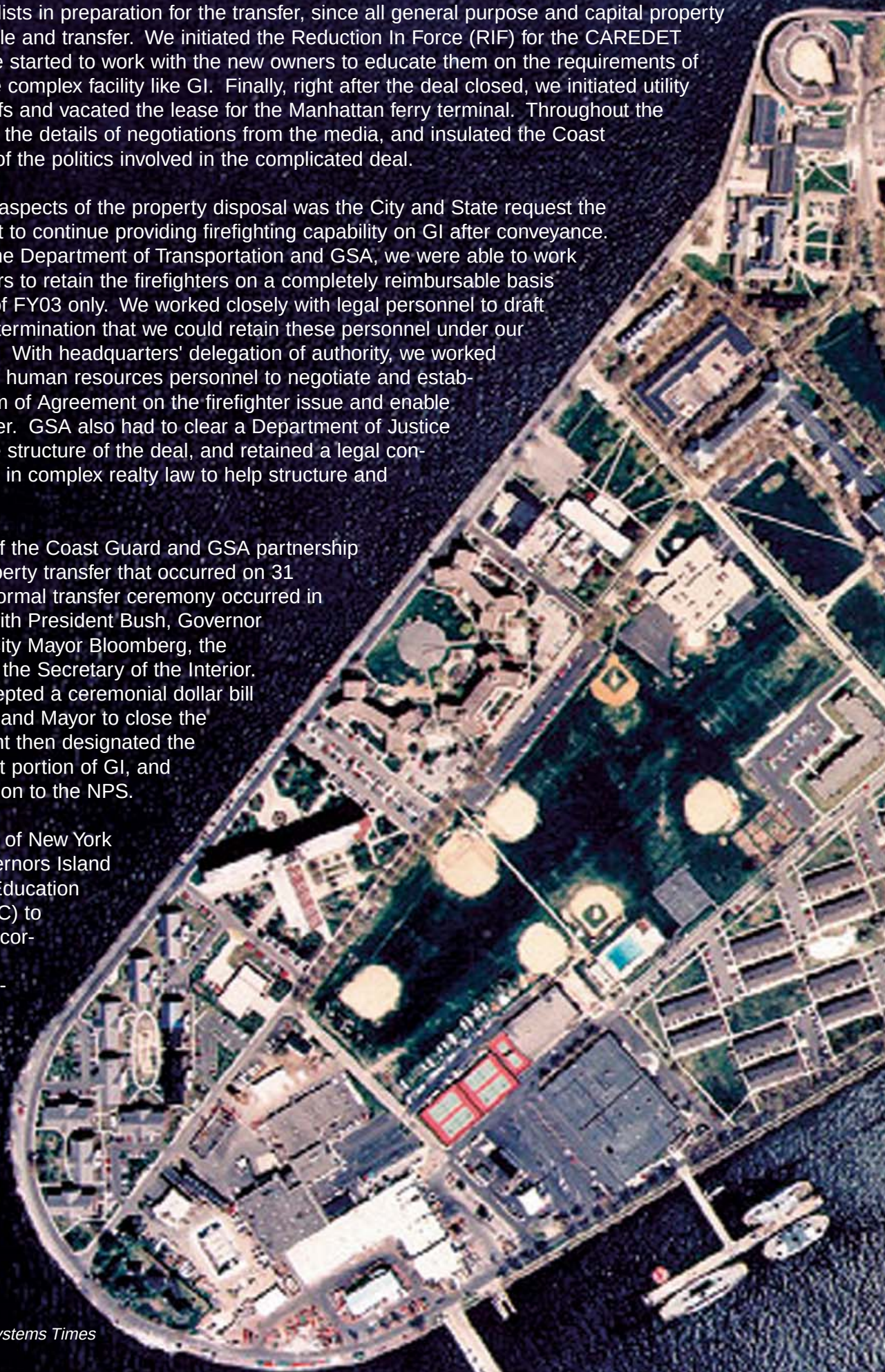
While GSA worked with the City, State, and NPS to negotiate and structure a deal for the property transfer, the Coast Guard played a key role in the property's disposal. We surveyed and established the easements that we needed for Aids to Navigation (ATON) and Vessel Traffic Service (VTS) equipment. We finished environmental clean up projects and met monitoring requirements to gain clearance letters from the New York State Dept of Environmental Quality. We

validated property lists in preparation for the transfer, since all general purpose and capital property were part of the sale and transfer. We initiated the Reduction In Force (RIF) for the CAREDET employees, and we started to work with the new owners to educate them on the requirements of maintaining a large complex facility like GI. Finally, right after the deal closed, we initiated utility transfers and cutoffs and vacated the lease for the Manhattan ferry terminal. Throughout the process, GSA kept the details of negotiations from the media, and insulated the Coast Guard from some of the politics involved in the complicated deal.

One of the unique aspects of the property disposal was the City and State request the federal government to continue providing firefighting capability on GI after conveyance. At the request of the Department of Transportation and GSA, we were able to work with the new owners to retain the firefighters on a completely reimbursable basis for the remainder of FY03 only. We worked closely with legal personnel to draft a Findings and Determination that we could retain these personnel under our Title 14 authorities. With headquarters' delegation of authority, we worked with both legal and human resources personnel to negotiate and establish a Memorandum of Agreement on the firefighter issue and enable the property transfer. GSA also had to clear a Department of Justice review of the entire structure of the deal, and retained a legal consultant specializing in complex realty law to help structure and close the deal.

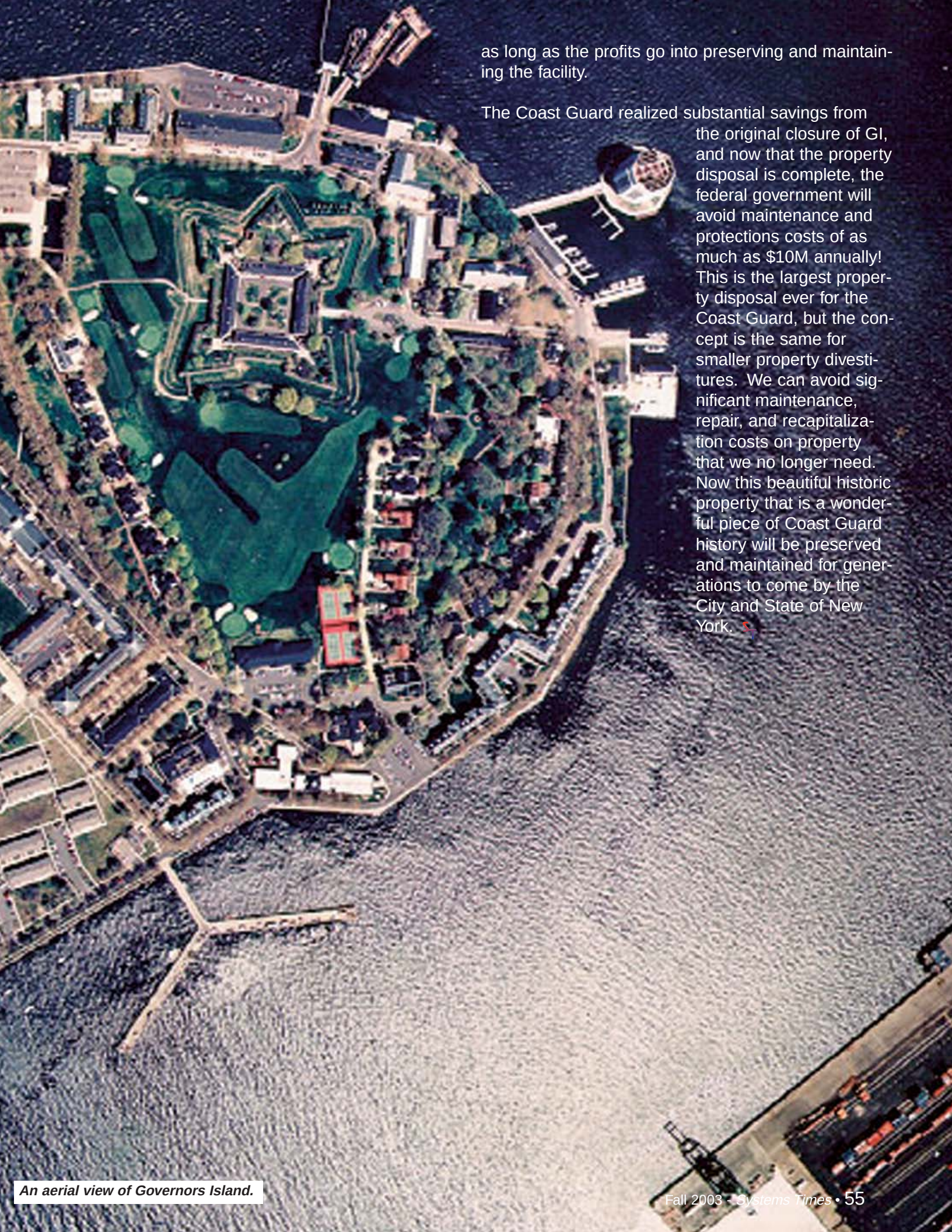
All the hard work of the Coast Guard and GSA partnership paid off with a property transfer that occurred on 31 January 2003! A formal transfer ceremony occurred in the White House with President Bush, Governor Pataki, New York City Mayor Bloomberg, the Commandant, and the Secretary of the Interior. The President accepted a ceremonial dollar bill from the Governor and Mayor to close the deal. The President then designated the National Monument portion of GI, and conveyed that portion to the NPS.

The City and State of New York chartered the Governors Island Preservation and Education Corporation (GIPEC) to administer GI in accordance with the use restrictions and historic preservation requirements built into the deal. They are developing plans that emphasize educational and public park uses. They are allowed to have commercial enterprise on GI



as long as the profits go into preserving and maintaining the facility.

The Coast Guard realized substantial savings from the original closure of GI, and now that the property disposal is complete, the federal government will avoid maintenance and protections costs of as much as $10M annually! This is the largest property disposal ever for the Coast Guard, but the concept is the same for smaller property divestitures. We can avoid significant maintenance, repair, and recapitalization costs on property that we no longer need. Now this beautiful historic property that is a wonderful piece of Coast Guard history will be preserved and maintained for generations to come by the City and State of New York.



An aerial view of Governors Island.

USCG CIVIL ENGINEERING UNIT PROVIDENCE MAKES A DIFFERENCE

Design Team 2 Members, Clockwise, LT Jose Pena, Mr. Scott Arsenault, and Mr. Frank Vogel with their student team members display their bridge entry in the CEU Providence 2003 Popsicle Bridge Competition.

by Frank Cole
Civil Engineering Unit Providence
Senior Planner and Partnership in Education Coordinator

On Friday, 10 January 2003, Civil Engineering Unit (CEU) Providence, a 59-member Coast Guard unit located in Warwick, Rhode Island, was presented the 2002 U.S. Coast Guard Collaborative Partnership in Education Award for Outstanding Partnership with the Chamber Education Foundation and several schools from the Warwick School Department. This award is for promoting academic excellence among the students of the Coast Guard Partnership in Education Program. It's the culmination of a decade-long association between CEU Providence and the Chamber Education Foundation. Also, in 2002, the unit was honored by being selected for the Youth Caring For Others International 2002 International Caring Award and a Resolution of Congratulations from the City of Warwick City Council, the State of Rhode Island, and the Providence Plantations. Certifications were presented to each individual mentor, e-mentor, and tutor at USCG CEU Providence. On an individual level, Mr. Robert Pulver was presented the Senator John H. Chaffee Humanitarian Award by the Rhode Island Federal Executive Council for his dedication to the youth of Warwick, Rhode Island, as a mentor, tutor, and coach.

Civil Engineering Unit Providence has been associated with the Chamber Education Foundation, a division of the Warwick Chamber of Commerce, since September 1993. Mr. Alfred Jacobs, former Partnership in Education Coordinator and current CEU Providence Technical Director, and Ms. Arlene McNulty, the Chamber's Director, developed this partnership when Mr. Jacobs pioneered a way for the CEU to foster interest in engineering at the Regional Vocational Technical Center. At that time, the Voc Tech center did not have a program in place to utilize CEU's engineering experience. Mr. Robert Hay, an advisor to the Voc Tech Center, was aware of Chamber's relatively young mentoring program and saw CEU Providence as an ideal fit. In 1993, CEU Providence embarked upon its Mentoring program with eight mentors. Spanning the last ten years, over 50 unit members have participated in the program, volunteering in excess of 15,000 hours of

their time. The Unit supports the local education community in many different ways. Today 14 military and civilian members serve as mentors to elementary and junior high school students, meeting with them once a week before or during the school day. Based on the Chamber's most recent survey of mentees, parents, and teachers, all of the students that completed the survey wanted their mentors to return for the next academic year. A majority of the teachers and parents indicated a significant increase in each child's self esteem and most of the teachers reported an improvement in the student's attitude toward schoolwork. Interestingly, an improvement has been seen in each mentor's morale.

Three years ago, the Chamber requested a volunteer to tutor a high school student in mathematics. From that point the tutoring program has grown by leaps and bounds. Last year six members of the unit tutored more advanced high school courses including algebra, geometry, trigonometry, calculus, chemistry, and physics at Warwick Veterans Memorial High School. Several students who were tutored demonstrated considerable improvement in algebra and geometry, while four earned honors grades in each subject and several graduated with honors and accepted to colleges. This year 10 personnel from the unit tutor high school students and, at the request of the school principal and guidance department, have expanded the tutoring curriculum program to include liberal arts and foreign language courses including History, English, Literature, and Spanish. One of our design team leaders also sits as a member of the Engineering Graphics Technology Committee for the Regional Vocational/Technical Career Center; occasionally the CEU has hosted a Computer Aided Drafting and Design (CADD) intern to provide an in-situ learning opportunity. The philosophy of CEU Providence volunteers is to help make a difference in each student's life. This is not to say that academic excellence is not important, but it's not the primary reason why CEU personnel are involved in mentoring and tutoring. They give of their time because they care; because they want to help people, especially the youth of the community.

The Unit's commitment to Warwick's youth includes a job shadowing/career day with student teamwork competitions. For the past three years CEU Providence, in collaboration with the Chamber Education Foundation, has conducted a Popsicle Bridge Competition for Warwick Junior High School students. Students are paired with CEU personnel in several teams to build bridges out of Popsicle sticks, dental floss, and glue. The students learn problem-solving techniques and that teamwork is essential to solve a problem in a constrained time frame. They also learn some basic physics and that engineering can be fun. This year, Mayor Scott Avedisian, Mayor of the City of Warwick, Rhode Island, and Warwick School Superintendent, Mr. Robert Shapiro, served as judges. They described the event as a "resounding success" and next year want to participate in the competition on a team formed of just teachers and school administrators.

Mr. Jacobs continues to play an integral role by introducing the Rhode Island Federal Executive Council (RIFEC) to mentoring. Collaborating with officials of the Feinstein/Warwick Mentoring Program, which is a statewide mentoring program, the ultimate goal is to follow the model established by CEU Providence and initiate a pilot-mentoring program for other federal agencies throughout the State. In January 2002, in conjunction with a statewide advertising program promoting national mentoring month, three new mentoring programs were developed in Providence, West Warwick, and Newport, Rhode Island, all sponsored by federal agencies. The success of the initial statewide federal mentoring programs have fostered an additional seven new programs supported by various other federal agencies (e.g., Federal Highway Administration, U.S. Bankruptcy Court, Social Security Administration, etc.).

Since September 11th, President Bush has called upon citizens to devote time to volunteering in their communities. In his 2003 State of the Union Address, President George W. Bush focused attention on the mentoring movement and highlighted the need for adults to volunteer as mentors. CEU Providence members continue to embrace his call by giving their time and talent to the youth of Warwick. Events like the Popsicle Stick Bridge Competition provide excellent visibility for the Coast Guard, but far more importantly, affords students an opportunity to understand how the Coast Guard serves their community, while learning something new and enjoying the experience. Every time CEU personnel mentor or tutor youths in Warwick they augment the mission of the Coast Guard. Their unselfish dedication and hard work have been duly recognized by a number of agencies. Coast Guard military and civilian personnel serve not only as mentors and tutors, but also as role models and recruiters. ST

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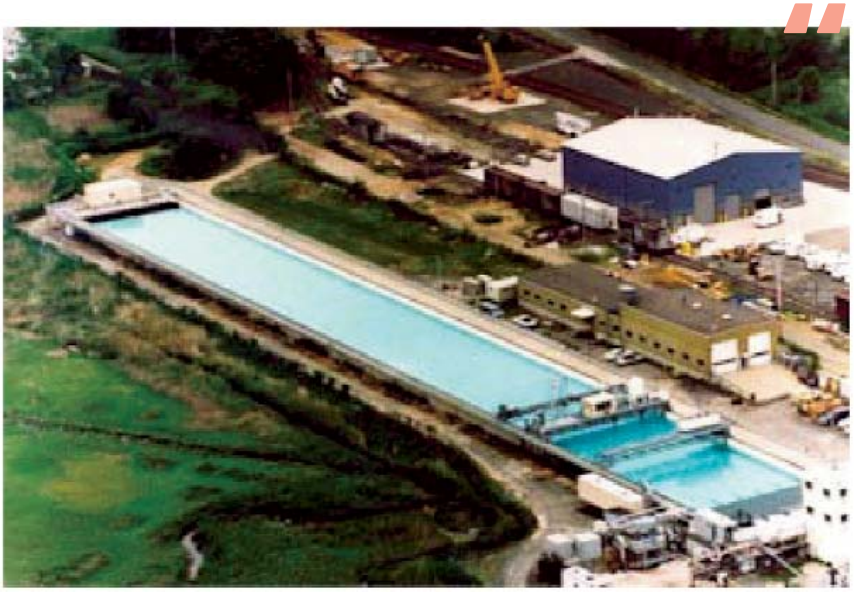
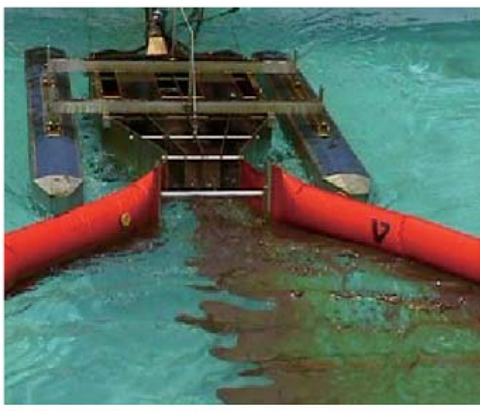
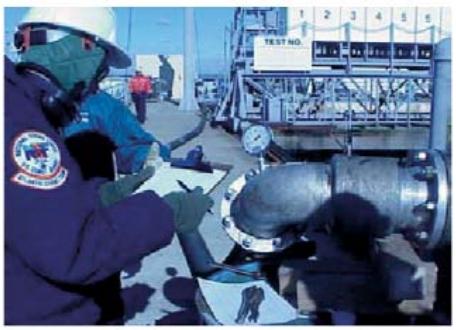






With Oil, Test With Oil"

by **Bruce Schuckman and**
LCDR Peter Nourse
Office of Civil Engineering (G-SEC)

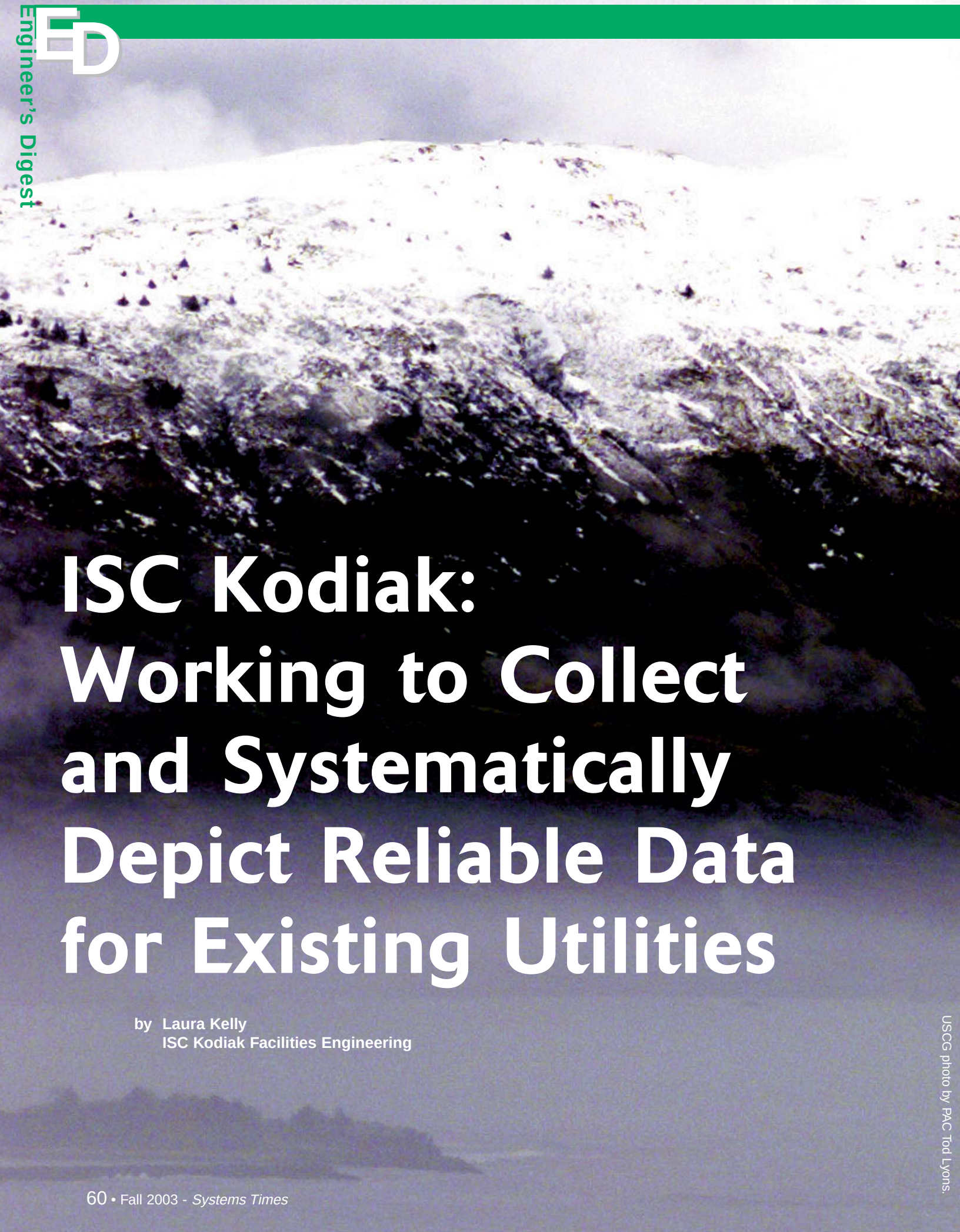
Their moto is, "Train with oil, Test with oil," and that's just what the Oil and Hazardous Materials Simulated Test Tank, also know as Ohmsett, is there for. Situated at the Naval Weapons Station Earle Waterfront in Leonardo, New Jersey, Ohmsett is the premier oil spill response test facility in existence. Built by the Environmental Protection Agency in the mid-1970s and currently administered by the Minerals Management Service for the Department of the Interior, Ohmsett's features and capabilities are world renown. The large, outdoor aboveground concrete tank is more than two football fields long at over 660 feet, is over 60 feet wide, and is eight feet deep. The tank is filled with 2.6 million gallons of saltwater. Equipment features include a main towing bridge capable of towing full-scale oil collection systems up to 6.5 knots. Additionally, there is a wave generator capable of simulating regular waves over three-feet tall and harbor chop. Its oil distribution and recovery system provides oil and custom oil-water emulsions onto the tank's water surface. An impressive data acquisition suite includes a fully computerized 32-channel logging system. The facility can also conduct research and training in oil dispersants and in-situ oil-on water burning. Recent expansion in their capabilities includes the advent of technology to allow oil skimming in a simulated arctic environment. These features make Ohmsett optimal in the research and development of marine oil collection devices and in the proper training of response personnel.

The Ohmsett facility is truly unique. Opposite page top photo: the Ohmsett facility. First row: The Coast Guard conducts much of its oil spill response training here. Second row: Many premier oil collection systems have been developed here, including those of the Coast Guard. Third row: The size and geometry of the test tank were ideal when the Coast Guard was developing its heavy viscous oil lightering response system (left); Ohmsett can simulate arctic conditions in oil collection testing (center); Ohmsett is an excellent environment for conducting in-situ oil burns and the testing of fire-retardant oil containment booms.

Government agencies, universities, private response organizations, and equipment manufacturers from all over the world utilize this one-of-a-kind facility. The U.S. Navy Supervisor of Salvage and Space and Naval Warfare Command use the Ohmsett facility. In addition, the foremost known names in marine pollution response equipment manufacturers have used Ohmsett to develop the state of the art response systems currently in use. But, where is the Ohmsett-Coast Guard connection?

The Pollution Response Section of the Ocean Engineering Division of the Office of Civil Engineering, has used this valuable resource to test many experimental oil collection devices, many of which are now in the Coast Guard pollution response inventory. These devices include high-speed oil skimming systems and emergency heavy viscous oil lightering response systems. In addition, Ohmsett hosts several Coast Guard Oil Spill Response Technician (OSRT) courses each year. These courses qualify WLB and WLB crews in the operation of their Spilled Oil Recovery Systems (SORS) and Vessel of Opportunity Skimming Systems (VOSS). The National Strike Force, the Coast Guard's elite hazardous material response unit, like-wise trains at this facility. The large test tank and towing bridge allows students to operate these response systems at full scale under simulated environmental conditions and with oil.

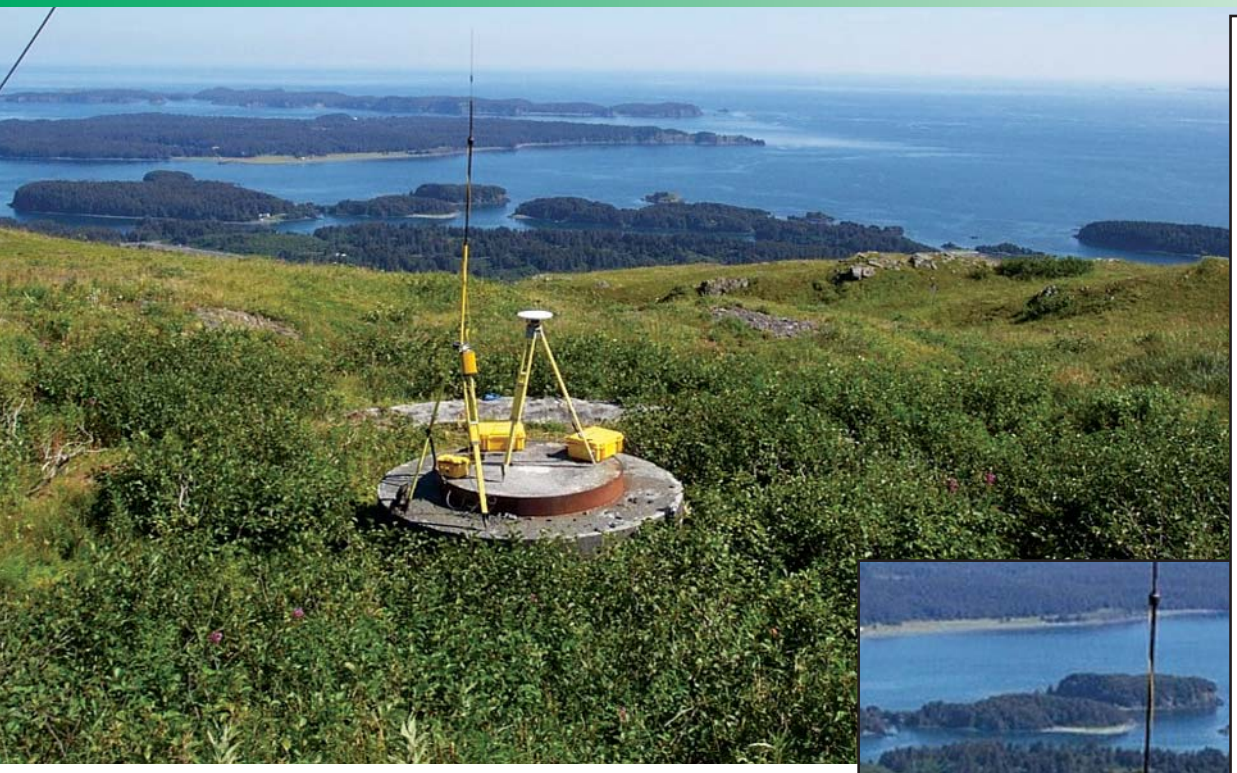
Oil collection in the marine environment is anything but trivial. Successful techniques and methods are unique to manipulation of the dynamic water-oil interface with highly specialized equipment. As such, proper marine pollution response training can only be obtained when training with oil. To prevent and minimize environmental disaster, there is no substitute for testing and training with oil. ST

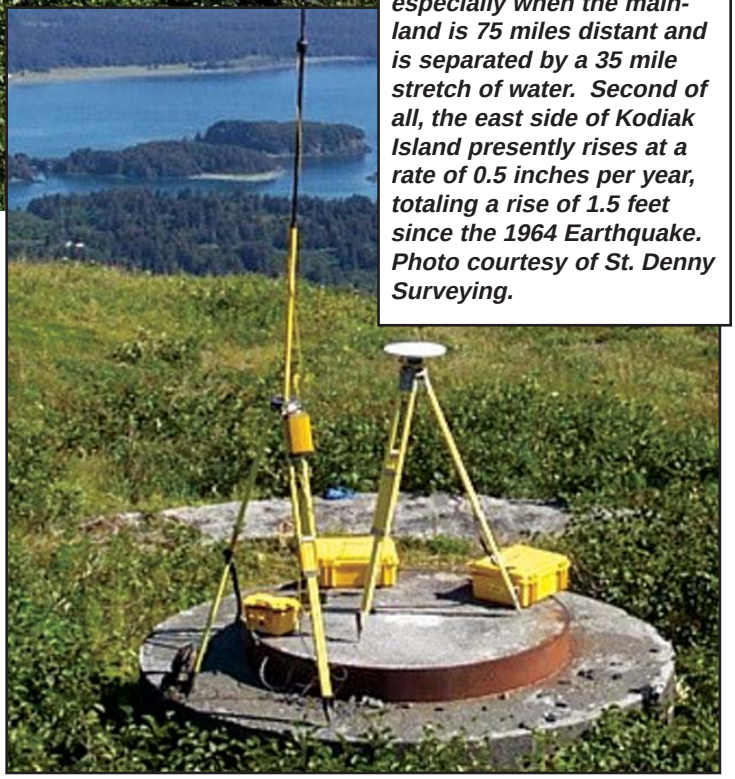


ISC Kodiak: Working to Collect and Systematically Depict Reliable Data for Existing Utilities

by Laura Kelly
ISC Kodiak Facilities Engineering

USCG photo by PAC Tod Lyons.





The photograph depicts a Global Positioning System (GPS) unit that was used to verify and establish horizontal control at ISC Kodiak. Traditional surveying instruments were utilized, as well. The combination ensures greater accuracy. Establishing survey control at Integrated Support Command Kodiak in relation to existing state plane coordinates is especially difficult for several reasons. First of all, line-of-site is difficult to establish with traditional equipment on an island, especially when the mainland is 75 miles distant and is separated by a 35 mile stretch of water. Second of all, the east side of Kodiak Island presently rises at a rate of 0.5 inches per year, totaling a rise of 1.5 feet since the 1964 Earthquake. Photo courtesy of St. Denny Surveying.

I start each day stating, "Focus On What You Can Do, Not What You Can't." Three years ago I started my first civilian position with the Coast Guard (USCG) as a Civil Engineer at the Integrated Support Command (ISC) Kodiak. Since that point in time maintaining that focus has been challenging. In addition to inheriting a long list of projects requiring design work and specifications from a predecessor five to six months gone, I became responsible for the storm sewer, and was subsequently charged "System Expert." Supervisors gave me numerous file folders for the first task, and four drawings for the latter.

I immediately recognized the level of effort required to catch up with the design work, but thought nothing of mastering only four drawings for the storm system on "The Worlds Largest Coast Guard Base," which encompasses 33 square miles of land with 15% of it extensively covered by facilities and utility systems. Three years later, I've completed all the work on that original design list (and then some), but it may take a lifetime before I can call myself the "System Expert" for the storm sewer.

Prior to joining the USCG, I worked for a consulting firm that catered to municipal governments, but primarily worked with surface coalmines in Wyoming. Site planning was my forte and I especially enjoyed tackling drainage issues. In my eyes, surface run-off for the USCG's general operating area of three square miles paled in comparison to the coalmines, where operators discussed opening seven-mile long "super pits." Because of their size, coalmines had large staffs, extensive surveying networks, and top-end equipment dedicated to surveying, mapping, planning, and archiving every aboveground and underground feature within their property boundaries. This was also true of the municipalities for which we worked. They had already learned there was nothing worse than accidentally hitting a fuel line or mistakenly connecting a water system to the wrong pipeline.

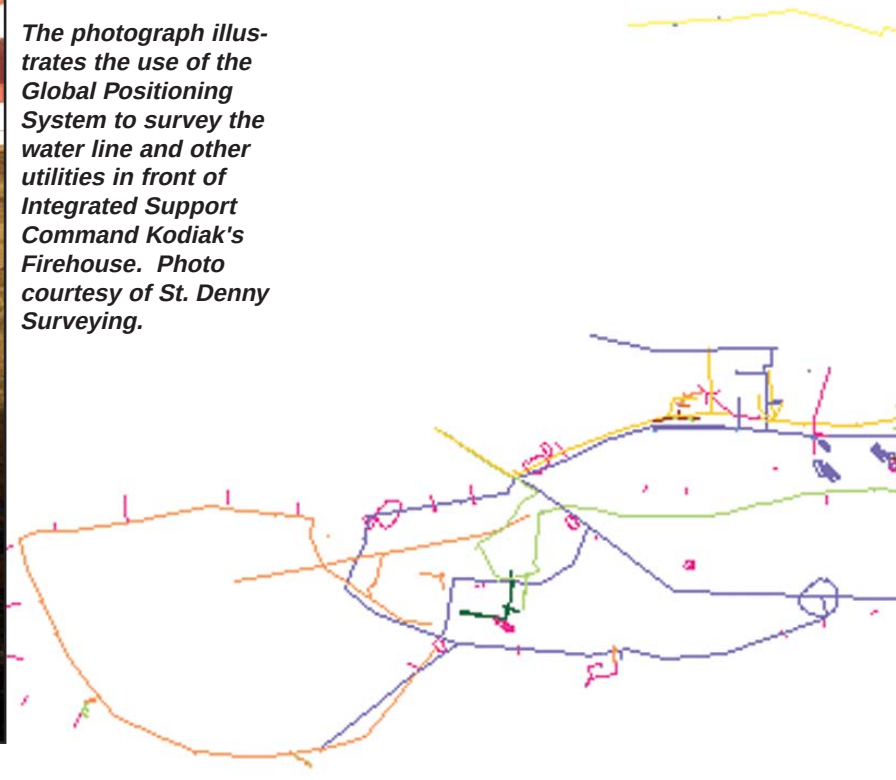
Closer examination of the four maps of the USCG storm sewer system revealed that they were not truly as-built drawings. To begin with, they had a revision date of 1982 on them. Computer Aided Drafting and Design (CADD) became a standard in the 1980s, but the storm sewer drawings were not yet converted to digital format. They appeared to be to scale, though, and depicted what resembled a coordinate system. With effort, scanning the drawings, tracing key features via AutoCAD and scaling them into a true coordinate system would convert them to digital as-built drawings. Existing digital as-built drawings could then be imported and used to quickly update any work that had occurred since 1982 (which would be digital) and soon ISC Kodiak would have a record of the storm system. It was my nature to not see this as impossible, and besides, I'd completed similar work for mining and municipal clients.

In short order, though, it was discovered that the coordinate system was local, and that 80-90% of the original control points were gone. The Navy, who installed much of the original infrastructure, kept impeccable drafting records, but the 1940s blueprints had not been updated since the 1970s when the USCG inherited the base. At that time the USCG didn't have local staff engineers or draftsman. Additionally, the 1964 earthquake dropped the local land surface elevation six feet, and to make matters more complicated, Kodiak Island (and ISC Kodiak's facilities) rises an average of 0.5 inches per year. This means that since the earthquake, there has been a cumulative elevation change of over 1.5 feet. Furthermore, examination of the more recent digital as-built drawings revealed that they were merely design drawings, because contractors and the USCG usually ran out of time/money to update the drawings from field notes and as-built requirements were laxly enforced.

Regrettably, I was not alone. "System Experts" for the other eight underground utilities (sanitary sewer, water, fuel, steam, electrical, deluge, phone, cable) were in similar positions. They didn't have a master drawing of their underground utilities, either. They, too, were overwhelmed by the amount of poor or non-existent data, and knew there wasn't time to accurately map the systems for which they were responsible.

"How does anyone working for the base design and construct projects without having as-built data?" I asked. As suspected, there was a tremendous amount of "field work" associated with every major site construction project, and the USCG was paying

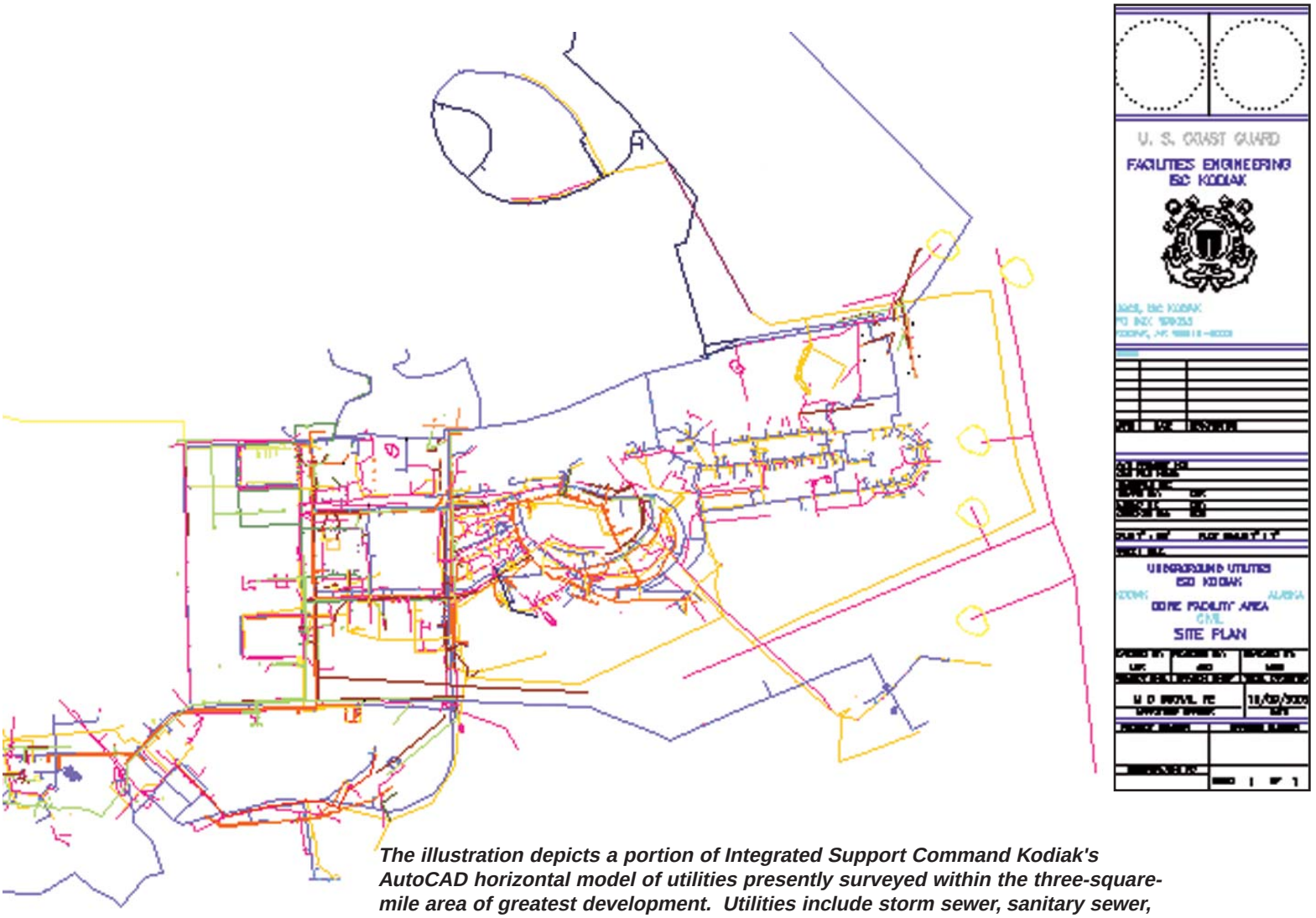
The photograph illustrates the use of the Global Positioning System to survey the water line and other utilities in front of Integrated Support Command Kodiak's Firehouse. Photo courtesy of St. Denny Surveying.



dearly. Unknown underground utilities were continuously being encountered, and pricey change orders immediately followed. Some went so far as to claim that that was why contractors loved working here. In reality, many just wished for a better means of doing business.

Doing business differently requires research, planning, and support. ISC Kodiak enabled all three to occur in support of efforts to begin the process of accurately mapping underground utilities. Research revealed that a software product by SurvCADD could be used to import survey data, and quickly generate and manipulate numerous symbols for manholes, valves, hydrants, etc. Planning for a new survey control network began, so that all utilities could be surveyed on the same coordinate system. Managers approved survey contracts to establish control and to begin locating underground utility systems.

Three years later, I'm proud to say that true progress is being made. Local managers and supervisors continue to provide necessary resources (time, money, and software). Our local Electronic Support Unit (ESU) continues to allow installation and upgrade of AutoCAD compatible application software called SurvCADD (by Carlson Software) thereby reducing the need to hire costly subcontractors to perform the work. Local surveyors continue to re-establish survey control (presently totaling over 150 new survey monuments) and it is tied to both the National Oceanic and Atmospheric Administration (NOAA) tidal bench marks (to assist with regular elevation calibration) and the state plane coordinate system so that



The illustration depicts a portion of Integrated Support Command Kodiak's AutoCAD horizontal model of utilities presently surveyed within the three-square-mile area of greatest development. Utilities include storm sewer, sanitary sewer, potable water, deluge water, electrical, steam, aviation and diesel fuel, television cable, and telephone/data lines. Many of these were originally installed during WWII by the U.S. Navy, but have been significantly upgraded since the Coast Guard (USCG) began operating the base in 1972.

Global Positioning System (GPS) may be used sometime in the future. Surveyors also provided raw surveying data files for all new manholes, water valves, and any major surface features. Using a combination of SurvCADD to import the data, and existing as-built drawing records, utility lines are being drawn so most as-built information is now incorporated into a single digital drawing. Field checks are being made to verify diameters, invert elevations, and pipe material. Individuals with local knowledge are providing crucial input. Contractors and inspectors are aiming to improve as-built drawing quality. Another benefit is that all new work utilizes the new coordinate system, so as-built data is easily updated.

The final result is an accurate as-built model of the critical utility systems of ISC Kodiak; an AutoCAD masterpiece! The above drawing is a culmination of all the utilities that have been surveyed and mapped at ISC Kodiak in the last two to three years. The 6MB drawing file has 60 layers depicting various aspects of each utility system. Annotations include diameters, year of construction, type of material, invert elevations, manhole labels, and references to original as-built drawings. Much of the storm, sanitary, water, steam, and fuel system is mapped in our horizontal coordinate system. Later on, vertical details will be added, enabling creation of a full three-dimensional model like the one of our facilities in relation to bedrock elevation, (see 3-D Drawing of area similar to utilities drawing).

Over-the-counter software such as SurvCADD allowed the process to be completed in a fraction of the time, at a fraction of the cost, but it requires having access to hard drives, which many ESUs won't allow. It also requires training for those not familiar with surveying. Future access to other AutoCAD compatible software may eventually make design work and data management even easier. A program such as SurvCADD Plan and Profile would enable our Engineering Division to quickly determine conflicts with proposed utility layouts. A program like AutoCAD Map would allow attribute information to be queried. This would allow quantification of all pipelines by age and diameter for each system, enabling systematic planning for utility maintenance.

The next step, however, is to produce final drawings of each system at a reasonable scale. At a scale of 1 inch to 40 feet, that becomes 90 drawings for each of the nine underground utility systems, or 810 drawings total. I smile, and remember my motto … of course, we're starting with the storm system.

The photograph illustrates the use of traditional surveying equipment near Integrated Support Command Kodiak's Air Station Hangar 1. Despite the trend toward the Global Positioning System (GPS), this equipment remains invaluable for establishing accurate survey control or measuring objects close to large facilities. Some buildings, such as airplane hangars, can cause an "echo" effect and distort GPS readings. Photo courtesy of Kodiak Land Surveying.

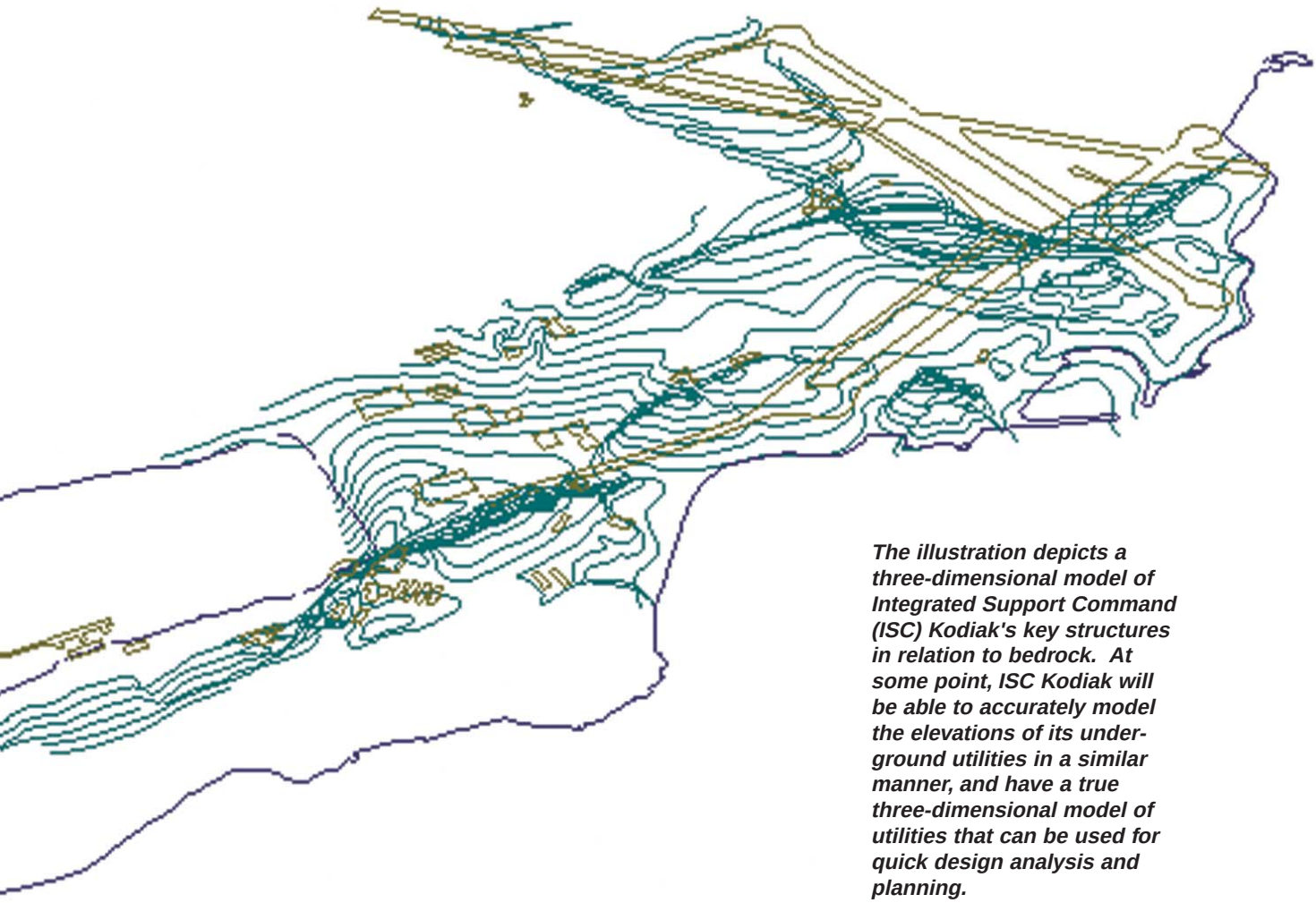
There is still much work to accomplish, but each day we come closer to ISC Kodiak's vision: To manage our facility efficiently and effectively. Accurate as-built drawings of utilities provides many benefits, but is best summarize by a quote taken from "Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data," American Society of Civil Engineers, 38-02. It states:

When subsurface utilities are discovered during the construction phase, the costs of conflict resolution and the potential for catastrophic damages are at their highest. That is why the collection and systematic depiction of reliable data for existing subsurface utilities is critical if engineers [and managers] are to make informed decisions and support risk management protocols regarding a project's impact on these utilities.

Further implementing, developing and building upon the desire to collect, map and manage underground utility information necessitates a collective vision by program managers, Civil Engineering support commands, ESUs, and field units. This is especially true if utilization of progressive technology is desired. Use of these technologies leads to precise underground utility locates, ultimately reducing manpower, downtime, and overall costs associated with facility maintenance. This article was submitted to the *Systems Times* in appreciation of the motto, "Working Today to Challenge Tomorrow."

Special Credits:

Mark St. Denny, St. Denny Surveying, Kodiak, AK; Jim Purdy, Kodiak Land Surveying, Kodiak, AK.; Boyd Jensen, Carlson Software, Maysville, KY.



The illustration depicts a three-dimensional model of Integrated Support Command (ISC) Kodiak's key structures in relation to bedrock. At some point, ISC Kodiak will be able to accurately model the elevations of its underground utilities in a similar manner, and have a true three-dimensional model of utilities that can be used for quick design analysis and planning.

CETC DELIVERS DIVERSITY OF SERVICES FOR COAST GUARD ENGINEERING WORKSTATION USERS

by **Paul Herold**
Civil Engineering Technology Center

From its origins the Civil Engineering Technology Center (CETC) has been the leader in Computer Aided Design (CAD) tools throughout the Coast Guard. From the development of Civil Engineering-Computer Aided Drafting and Design (CE-CADD) for use with AutoCAD in 1989 to a major leadership role in coordination of the National CAD Standard, released by the National Institute of Building Sciences in 2001, the CETC has supported the Coast Guard and industry in the advancement, development, education, and education in the deployment of CAD tools in support of the construction industry.

The Coast Guard CETC now provides, with Engineering Image 5.0E, a wide array of enterprise wide services including engineering workstation development, CAD standards, geospatial information management, 3D modeling, and Coast Guard wide document management support for engineering drawings and related documents needed for project management and bid sets. These types of applications are available for approximately 1,000 engineering workstations used by the civil, naval, electronics engineering staffs and other mission programs Coast Guard wide.

Developing Partnerships for Standards and Innovation

While the CETC maintains tight relationships with the Telecommunication and Information Systems Command (TISCOM), the Headquarters' Chief Information Officer (CIO), and Information Technology (IT) Directorates, it has also worked to establish on-going relationships with non-governmental partners that bring technology standards and innovation to the Coast Guard, other government agencies, and the private sector.

One significant partner is the National Institute of Building Sciences (NIBS (www.nibs.org)), who is the primary content provider for the National CAD

Standards. The Coast Guard, along with the Department of Defense (DoD), Construction Specification Institute (CSI), and American Institute of Architects (AIA) are NIBS top four content providers. The CETC holds a seat on the Board of Directors for National CADD Standards, and a seat on the Facility Information Council (http://www.nibs.org/ficover.html).

Perhaps the longest partnership exists with Tri-Services CADD GIS (Geospatial Information System) Technology Center for facilities, infrastructure, and environment (http://tsc.wes.army.mil). The CETC has been an active partner with the CAD GIS Center For Facilities since 1994. The Chief of Civil Engineering (G-SEC) is a member of the Board of Directors and CETC holds a corporate staff seat for DoD. As such, they contribute to the creation of ANSI standards for GIS as well as DoD.

Other partners within the CADD/GIS Technology Center include the Army Corps of Engineers, the Army, the General Services Administration, the National Aeronautics and Space Administration, the Air Force, the Marines, the Navy, the Defense Logistics Administration, the State Department, the Environmental Protection Agency, and the Federal Emergency Management Agency.

Providing IT Support for Multiple Coast Guard Programs

CETC is best described as the "TISCOM for engineers." It serves as IT configuration managers for the standard engineering workstation that uses enterprise resources to support engineering and/or graphic science software. The tight supervision of engineering workstation applications helps maintain a standard engineering workstation image that includes graphic based CAD/GIS or 3D modeling applications that are specific to engineering and graphic data viewing practices. Other applications such as Masterworks, SpecsIntact, and Convert v4.10 engineering tools are also made available on the standard engineering image. CETC can broker and deploy any engineering software applications to TISCOM for inclusion in standard image or Engineering image.

About 1,000 workstations depend on the CETC engineering workstation image. These users cross multiple programs including the USCG Academy, the Coast Guard Yard, and the Systems Directorate.

Exercising its responsibility to support engineering technology anywhere that is needed, CETC gets involved in a surprising range of applications. At the USCG Academy for example, the CETC provides enterprise access to ESRI's full suite of GIS software for on-line research and instruction for cadets.

At Headquarters, the CETC is a key member of the Geospatial Information Management Board. "The CETC was central in providing technical support related to existing standards and the use of technology as well as helping to develop the budget," said Ann Sulkovsky, U.S. Coast Guard Office of Enterprise Architecture. "The CETC provided the lead for the Data Breakout Group during the CIO's December GIS Workshop and also provided Coast Guard panel representation for the CIO at the February ESRI Conference in Washington, DC."

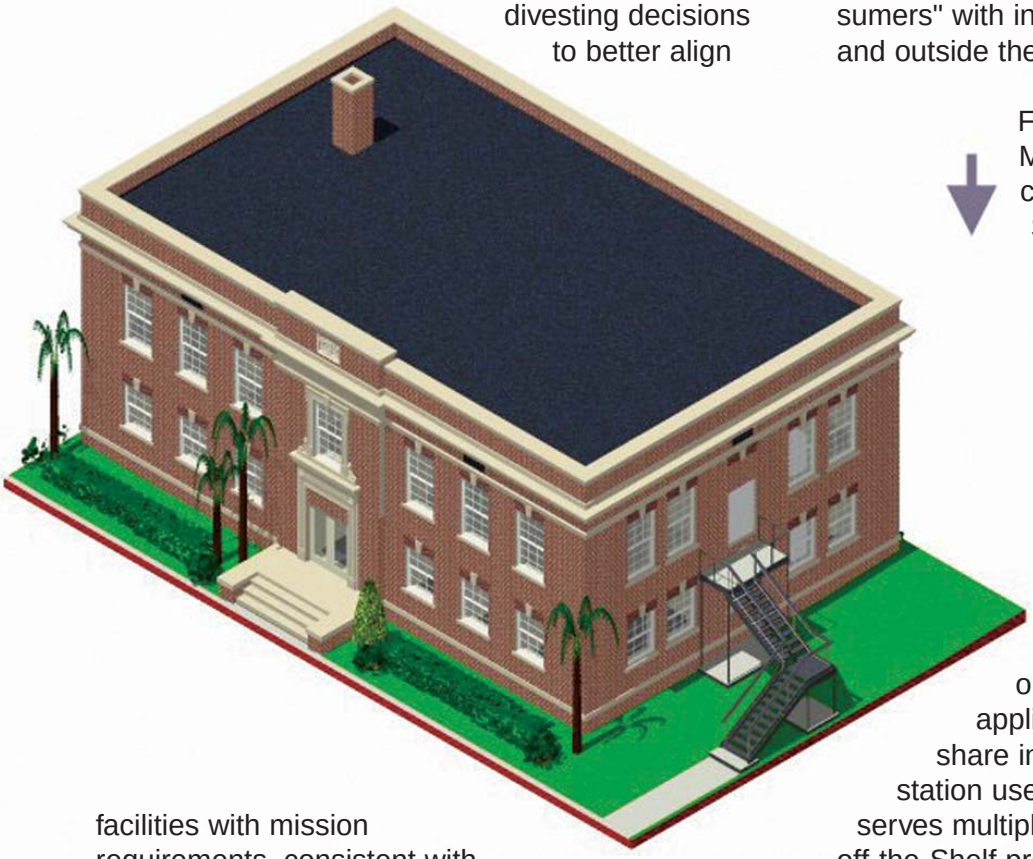
CETC also supports naval engineers at the Coast Guard Yard in Baltimore, who use CETC-approved document management systems to achieve industry standard ISO-9000 compliance.

Supporting Enterprise Wide Initiatives

Beyond the wide array of IT functions it supports, CETC has an important role in emerging enterprise wide initiatives, such as Shore Facility Capital Asset Management (SFCAM) and Regional

Strategic Planning (RSP). These initiatives require the coordination and deployment of enormous amounts of data as well as interoperability between CADD, GIS, Modeling, and document management systems. For these projects, the Coast Guard relies on the CETC to provide expertise in industry standards, 3D modeling, geospatial systems, asset management, and data distribution across multiple, dispersed geographic areas.

Shore Facility Capital Asset Management (SFCAM) is a strategic initiative that "integrates planning, investing, using, and divesting decisions to better align facilities with mission requirements, consistent with budget realities." The project has generated thousands of documents describing a multitude of facilities, all of which are managed, stored, and made accessible to everyone in the Coast Guard through the CETC's enterprise wide document management system.



SFCAM is the foundation for another even more overarching data management initiative. While SFCAM manages assets, Regional Strategic Planning (RSP) takes asset management to yet another level. With the help of CETC brokered technology, RSP is tracking assets through their life cycle with the help of 3D architectural tools that enable simulation, shore facilities that are managed in "4D" -- that is, the three dimensions of space along the fourth dimension of time in support of funds management.

Graphisoft's ArchiCAD software is being used for spatial database design and 3D modeling of RSP facilities. More importantly, it is used to generate 3D databases for facility life-cycle management. ArchiCAD is a life-cycle management and maintenance tool that provides a model and database of shore facility assets and representational operational assets. ArchiCAD's 3D database is integrated with ESRI's GIS tools to provide content "consumers" with instant access to information inside and outside the model.

For managing CAD files, ArchiCAD Models and related specification and contract documents, CETC is using Synergis Adept document management. The CETC has used NFM3 and Adept since 1998 and is broadening the scope of its capabilities from a localized NFM3 file management to the Adept enterprise wide system that manage documents across multiple districts and geographic regions. The Coast Guard Intranet allows a holistic look at facility and shore support. Thanks to the enterprise wide standardization on one document management software application, Coast Guard engineers can share information with all engineering workstation users. Thus a common software tool serves multiple functions. The same Commercial-off-the-Shelf product that the Yard uses to manage their engineering documents is used by the CETC for the RSP and to archive engineering information.

Bringing it All Together

While the breadth and scope of the CETC mission is sometimes hard to grasp, the mission basics are pretty clear. When a science or engineering application makes economic sense, it's made available to Coast Guard engineers and decision-makers.

The CETC, more than anything else, is a provider of information and the software tools needed to help people work together. By providing access to information, the CETC promotes better conductivity, communication, and interoperability.

NEW MLCLANT PRESERVATION AND MAINTENANCE INITIATIVES

by **Paul W. Beausejour**
Naval Engineering Division (vs)
Maintenance and Logistics Command Atlantic

U.S. Coast Guard Photo.

For quite some time, we, in the Atlantic (LANT) area, have been concerned with not only the frequency, but also, the extensive amount of bottom/bilge plate renewal during scheduled and emergency drydock availabilities for vessels within our jurisdiction, in particular, 110-foot Patrol Boats (110 WPBs). Typically, the determining factors for plate renewal have been, 1) unacceptably thin plate thickness (less than 75% of original thickness), as revealed by ultrasonic thickness inspections, and 2) water intrusions/leaks (while underway), caused by internal corrosion. To remedy this problem, we have recently instituted a number of measures, which include, but are not limited to the below initiatives.

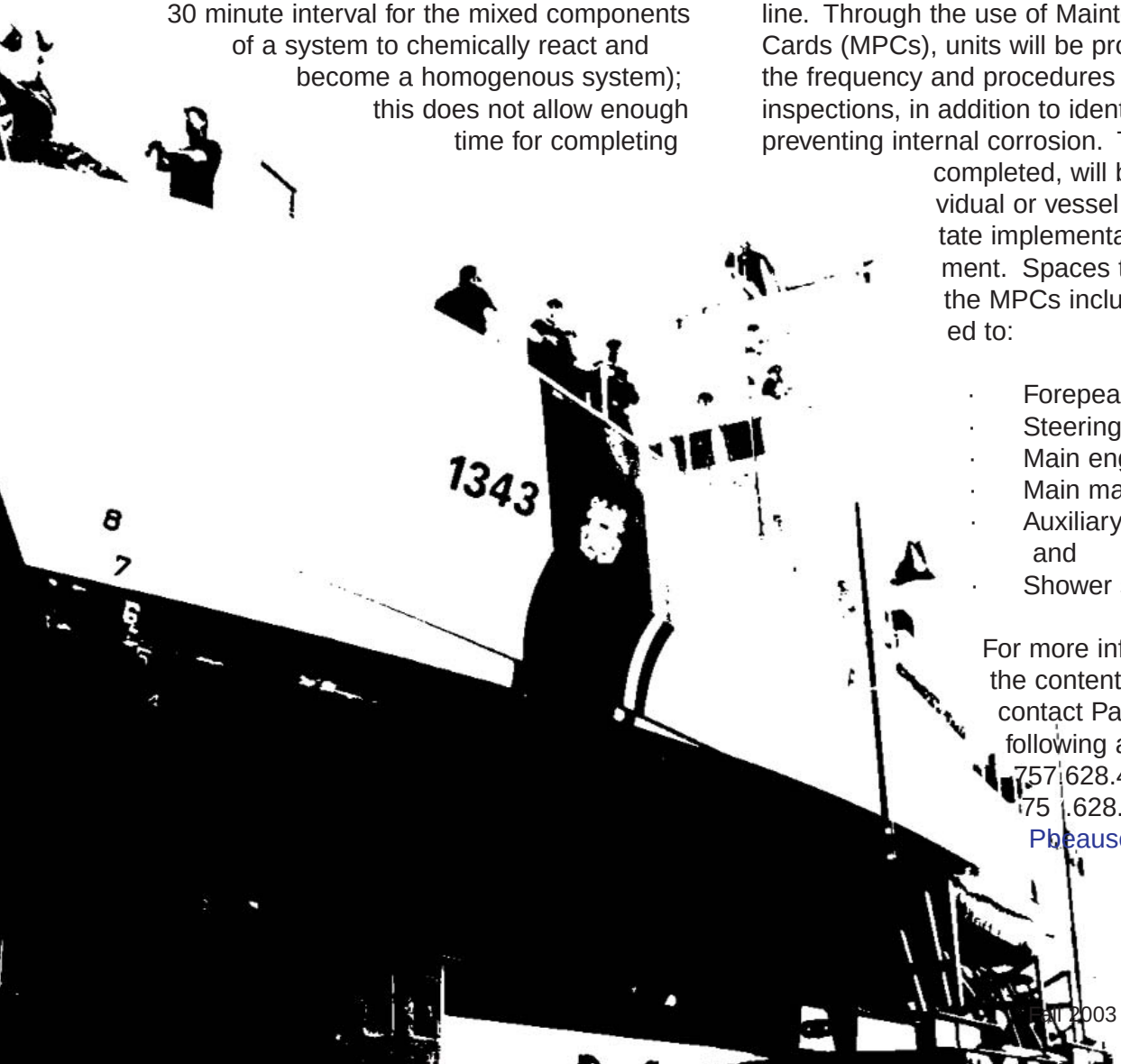
Surface Preparation. We have moved to restrict future underwater hull surface preparation methods for 110 WPBs solely to high-ultra pressure (10-55k psi) water-jetting; this method removes coatings and invisible surface contaminants (soluble chlorides), but does not remove metal or create a new surface profile. Based on a recent analysis of the thinning hull problem, we've determined that during the past 15 years, a typical 110 WPB has lost approximately 17.5 mils or 11 percent of its original bottom plate thickness, due to extensive abrasive-blasting during underwater hull preservation -- an every four year occur-

rence for this vessel class. Abrasive blasting is a destructive procedure; it removes metal and etches the substrate, to produce the 1.5-3.5 mil anchor profile that is required by most manufacturers for successful coating adhesion. Water jetting, on the other hand, only exposes the existing surface profile, obtained during previous abrasive-blasting procedures.

Edge Retentive Coating. To address the internal corrosion problem, we have begun specifying the "Euronavy ES301S" top coating -- a high solids/low molecular weight coating which, by its chemical composition, has a more robust film build than a typical solvent-based/high molecular weight epoxy; consequently, it sticks and remains on edges, corners, welds, cut-outs, angles, and all other complex-shaped surfaces, where solvent-based coatings generally tend to fail prematurely. One draw-back, however, for a high solids coating is that it has a relatively short pot life (15-30 minutes @77 degrees F.) after mixing and induction (a 20-30 minute interval for the mixed components of a system to chemically react and become a homogenous system); this does not allow enough time for completing an application, before the coating solidifies and becomes unusable. Fortunately, two methods of application have been discovered to overcome the pot life problem: 1) the use of plural-component spray equipment and 2) the "hot pot" application method. During plural-component application, the two components of a coating system are never mixed (and can be reused over and over) until they are thrusted to the nozzle tip. The "hot-pot" application, on the other hand, involves keeping the pre-mixed components in a pot that is continuously heated while the system is applied -- this maintains the viscosity of the coating and prevent it from solidifying once the pot life has expired.

Inspection and Maintenance Protocols. In addition to the measures outlined above, we are also working with the Engineering Logistics Center (ELC) to develop and implement inspection and maintenance protocols for critical interior spaces -- generally, accessible compartments in contact with shell plating, below the waterline. Through the use of Maintenance Procedure Cards (MPCs), units will be provided guidance on the frequency and procedures for conducting inspections, in addition to identifying, arresting, and preventing internal corrosion. The MPCs, once completed, will become part of individual or vessel class CCMP, to facilitate implementation and enforcement. Spaces to be addressed by the MPCs include, but are not limited to:

- Forepeaks,
- Steering compartments,
- Main engine rooms,
- Main machinery spaces,
- Auxiliary machinery spaces, and
- Shower spaces.



For more information regarding the content of this article, please contact Paul Beausejour at the following addresses: 757.628.4573 (voice) or 757.628.4585 (Fax) or Pbeausejour@mlca.uscg.mil.

by LT Dave Smith, Marine Safety Office Valdez;
Mr. Scott Krammes, Vessel Traffic Service Project; and
LT Dennis Evans, Vessel Traffic Service Project

Making Maritime Domain Awareness a Reality

Using a Standards-Based Approach to Exchange Vessel Traffic Data

USCG photo by PA3 Christopher Grisafe.

Coast Guard

Marine Safety Office (MSO) Valdez is responsible for overseeing and protecting the highest volume petroleum-loading terminal in the United States, the Trans-Alaska Pipeline System Terminal. This facility supplies almost 50% of the West Coast's oil requirements. Immediately after the 11 September 2001 terrorist attacks, MSO Valdez moved aggressively to protect the terminal and the other maritime facilities in Prince William Sound, coordinating cutters and small boats patrols and controlling commercial shipping. There are no Groups or Stations in this part of Alaska, so the task of coordination fell directly to the Captain of the Port. In executing this mission MSO Valdez had the enormous advantage of operating a Vessel Traffic Service (VTS). VTS Valdez provided the Captain of the Port with a clear real-time picture of vessel movements throughout Prince William Sound.

In the weeks and months that followed, MSO Valdez began working closely with both the Commander, 17th District, and with the Defense Department's Alaskan Command to plan for the defense of critical maritime infrastructure in Prince William Sound. Alaskan Command is based at Elmendorf Air Force Base and is headed by an Air Force Lieutenant General. Though the U.S. Air Force (USAF), U.S. Army, U.S. Navy, and U.S. Coast Guard are all represented at Alaskan Command, the majority of personnel are Air Force. The strategic cultures of the Coast Guard and the Air Force are both distinctly military, but very different. The Coast Guard's tradition is built around a very large number of small units (cutters, stations, MSOs) dispersed geographically and exercising local initiative. As a general rule, higher echelons assume that their field units are out doing good things unless they hear otherwise. The U.S. Air Force culture stresses the central direction of airpower to achieve major strategic goals. Communication and sensor networks are established to allow General Officers to directly manage the battle at the numbered Air Force level. The maintenance of a Common Operational Picture (COP) is central to that process. USAF officers visiting Valdez quickly began discussing ways to build a shared COP between MSO Valdez and Elmendorf AFB, incorporating both the air and maritime pictures.

The air picture for Alaska originates from the Department of Defense (DoD) and the Federal Aviation Administration (FAA) tracking systems and is available via the SIPRNET. In short order, the Coast Guard built additional secure spaces at the MSO and

acquired some SIPRNET terminals. The maritime picture proved complex. We quickly realized that our Vessel Traffic Service display was the surface picture, at least for Prince William Sound. But we had no way to export it. Coast Guard Vessel Traffic Services were designed as stand-alone systems, principally for local navigational safety.

In the post-9/11 environment, it is increasingly obvious that some version of the COP is important to maritime domain awareness. The Coast Guard first began discussing maritime domain awareness in the 1999/2000 timeframe, in the report of the Interagency Commission on Crime and Security in U.S. Seaports, in the National Marine Fisheries Service's (NMFS) Vessel Monitoring System project, and in work on the design of the Coast Guard's Marine Information for Safety and Law Enforcement (MISLE) system, the U.S. Customs Service's Automated Commercial Environment, and the intelligence community's Joint Maritime Information Element (JMIE). However, these early proposals did not directly identify Vessel Traffic Services as an existing source of real-time data for the near-shore portion of a COP.

Other Vessel Traffic Services observed the same problem -- they had no way to efficiently share track data. A number of local solutions were tested on an emergency basis, but most provided data feed only to a single user (e.g., a WHEC [High Endurance Cutter] patrolling in the local area) and used nonstandard and often classified communication links. MSO Valdez considered a range of options. One method, initially suggested by the Air Force, would have split the radar signals at each Coast Guard shore site and transmitted them via leased circuits back to the North American Aerospace Defense Command (NORAD) air defense radar control at Elmendorf. Implementation of this solution would have resulted in significant expense, since the Coast Guard's shore radars do not transmit in TADIL-A format, and it would have been a one-of-a-kind fix, not easily scalable to other locations.

MSO Valdez and the Ports and Waterways Safety System (PAWSS) Project Team determined that the better solution, especially in a joint environment, would be to use the track sharing framework of the Global Command and Control System (GCCS) and the data transport capabilities of the nationwide Coast Guard Data Network. The GCCS's Unified Build is a component of the Defense Information Infrastructure Common Operating Environment (DIICOE) that allows multiple cooperating track databases to receive and share tracks from any number of sources and distribute them to users via simple desktop clients such as the Command and Control Personal Computer (C2PC). The GCCS is a standards-based, rather than an equipment-based, solution. The Coast Guard Data Network is a controlled and protected enclave of the .mil domain, and meets the functional requirements for hosting unclassified DIICOE products.

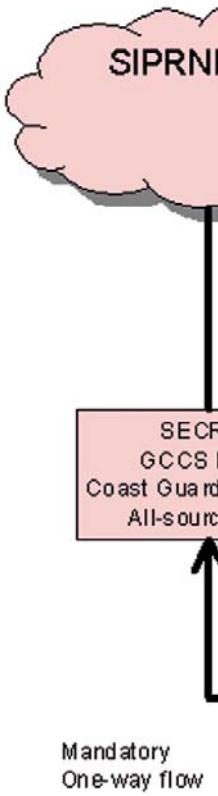
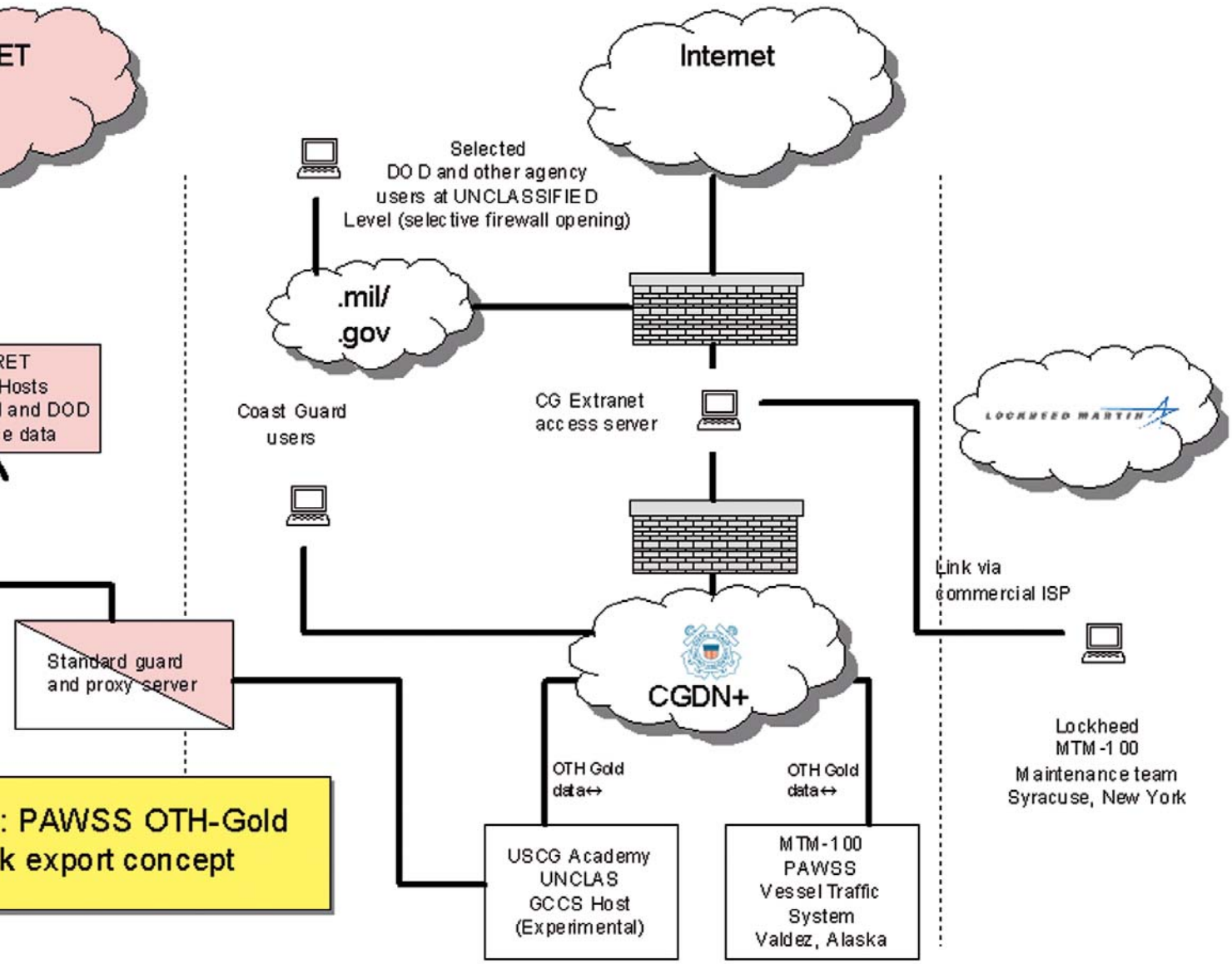


Figure 1
Trac

The PAWSS internal architecture is based on open standards and capable of handling and fusing many different track types and interfaces. MSO Valdez identified a very small subset of DIICOE elements, specifically the Over The Horizon-Gold (OTH-Gold) contact report messages, which, if generated properly by PAWSS, would allow direct interface to a GCCS track database. As an Independent Research and Development project, Lockheed Martin undertook the development of a C++ software thread for PAWSS that extracts tracks from the PAWSS internal network, fuses them with ship data from the PAWSS Oracle database, and formats them into the required OTH-Gold messages at user-defined intervals. The Team also identified a practical method (using Simple Mail Transfer Protocol) for the PAWSS to transmit these messages from Valdez via the Coast Guard Data Network plus (CGDN+) across the country to an unclassified GCCS host at the Coast Guard Academy, from where they can be accessed by any Standard Workstation III using Coast Guard-approved C2PC client software.


ET
Internet
Selected
DOD and other agency
users at UNCLASSIFIED
Level (selective firewall opening)
.mil/
.gov
RET
Hosts
and DOD
e data
Coast Guard
users
CG Extranet
access server
LOCKHEED MARTIN
Link via
commercial ISP
Standard guard
and proxy server
CGDN+
: PAWSS OTH-Gold
k export concept
OTH Gold
data↔
OTH Gold
data↔
Lockheed
MTM-100
Maintenance team
Syracuse, New York
USCG Academy
UNCLAS
GCCS Host
(Experimental)
MTM-100
PAWSS
Vessel Traffic
System
Valdez, Alaska

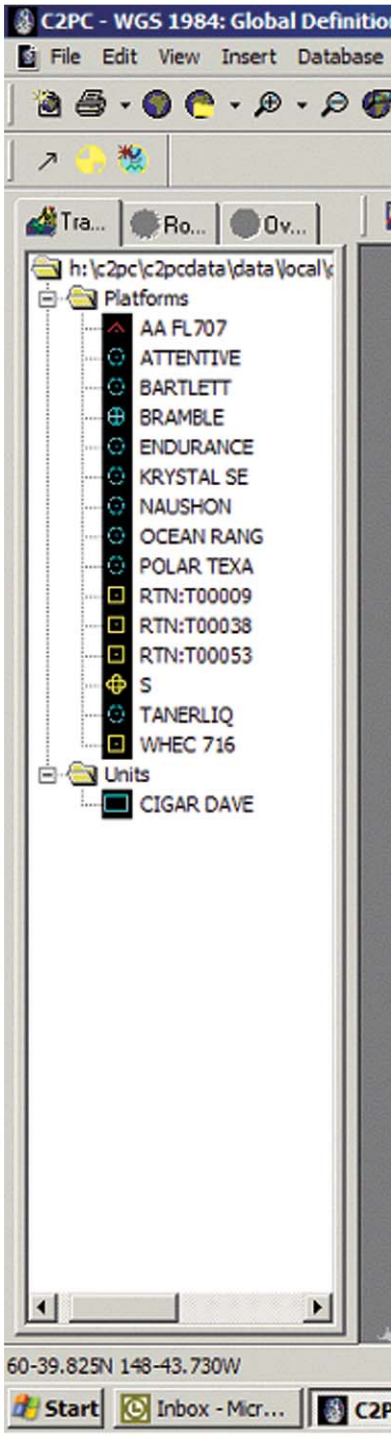
Most implementations of the GCCS in the U.S. Coast Guard and the other military services ride on the secret-level SIPRNET. However, the Coast Guard Academy's Electrical Engineering Department is heavily involved in data exchange and tracking projects and has operated an unclassified GCCS host as a teaching tool for a number of years. LCDR Greg Johnson and LT Mike Nasitka graciously agreed to let their system be the guinea pig for the test phase of this project. Use of an entirely unclassified framework avoided making any part of the PAWSS system classified and greatly simplified software development and testing. Techniques already exist for moving GCCS track information from unclassified systems to classified GCCS implementations via a high-assurance guard. Such guards are in use already at the U.S. Transportation Command, NORAD, and in Korea. The Coast Guard is currently installing guards and one-way data feeds at the Coast Guard Command and Control Center (C2CEN), the area Communications Master Stations, and at the major intelligence commands. Therefore the problem of data sharing with the classified-COP could be solved elsewhere where such guard exists.

Connection of the PAWSS system router at Valdez to the Coast Guard Data Network plus (CGDN+) necessarily required assignment of IP addresses and compliance with all CGDN+ security and configuration management policies, including wireless and terrestrial network requirements. MSO Valdez and the PAWSS Team developed a complete Engineering Change Proposal (ECP) to capture and manage these issues. Since PAWSS is a contractor-maintained system and contractor modems are not allowed on the CGDN+, MSO Valdez and the PAWSS Team also identified a method by which the contractor could tunnel securely into the PAWSS via the Coast Guard Extranet and the CGDN+ for maintenance purposes. Figure 1 shows the general system architecture (see page 76).

The additional support requirements for this capability are negligible. The system life-cycle support costs associated with the ECP for this innovation is $2.6K per port (non-recurring). The software modifications required to achieve CGDN+ interoperability have been integrated into the PAWSS software baseline at no additional cost to the government.

The system was first tested in August 2002. Figure 2 shows a sample Command and Control Personal Computer (C2PC) screen shot of traffic in Prince William Sound based on the data transmitted by the PAWSS.

As a result of the PAWSS OTH-Gold project, critical vessel information available at a Vessel Traffic Service will be instantly available to all authorized DoD and CG assets, without placing an additional workload on VTS operators. This greatly enhances the ability to evaluate and respond to homeland security threats by increasing the maritime domain awareness of DoD and CG security assets worldwide. Plans have been made to incorporate the PAWSS track data into a National Maritime Intelligence Center (NMIC) via CGDN+ in order to provide interoperability with other internal and external customers via the NMIC Maritime Awareness Global Network (MAGNET). In addition, after the initial proof of concept in Valdez, this capability is now being integrated into the baseline system of all future PAWSS ports.



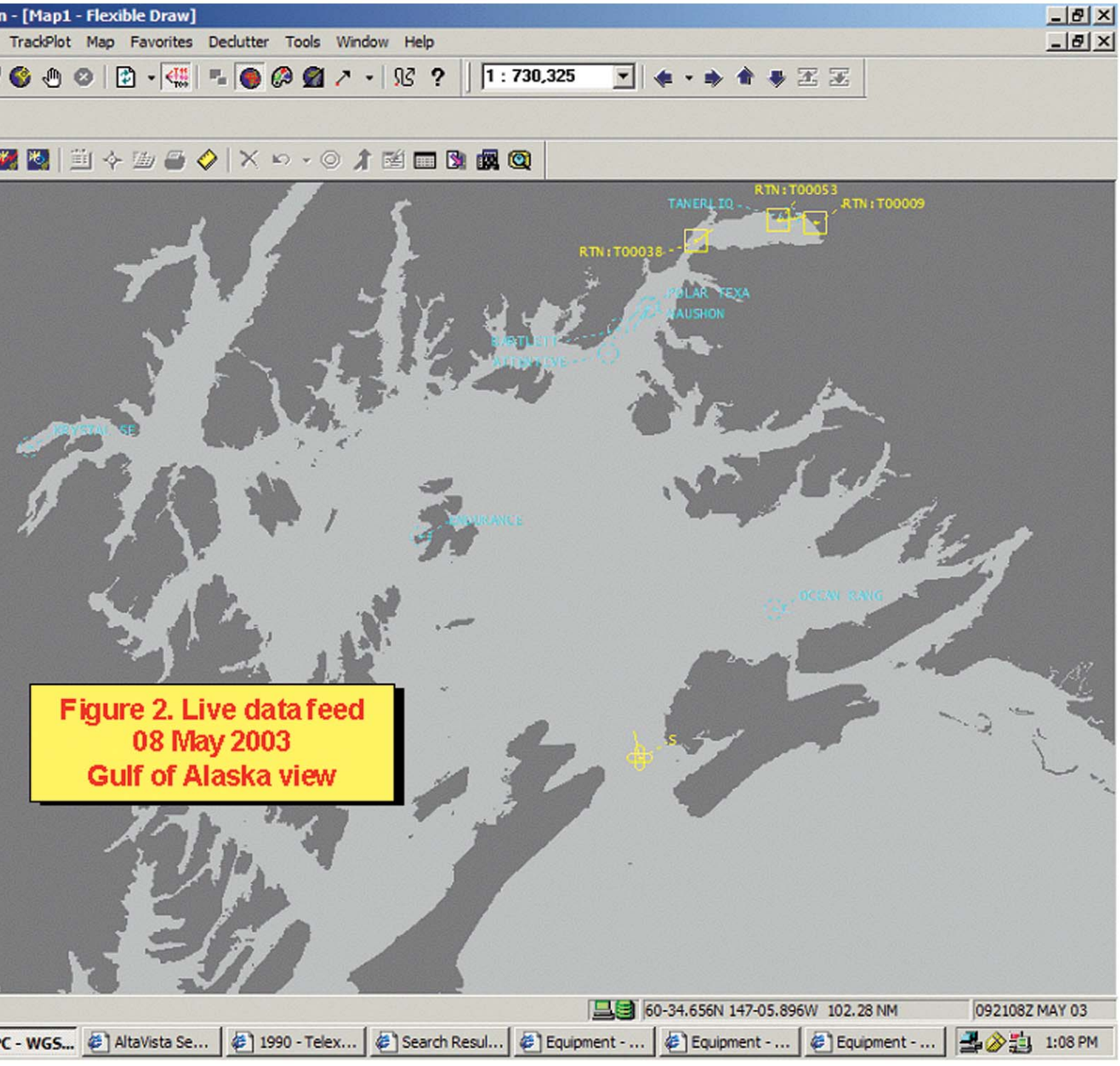


Figure 2. Live data feed
08 May 2003
Gulf of Alaska view

C4ISR

MODERNIZING LORAN COMMAND AND CONTROL

by LT Jim Betz
Loran Support Unit

The Remote Automated Integrated Loran (RAIL) project has been recently installed in the U.S. Loran-C radionavigation system, modernizing local transmitter command and control capabilities. RAIL's computer-based equipment suite works in conjunction with the new high speed frame relay data network, Locus Casualty Control Receiver Set and the remote control station's Loran Consolidated Control System (LCCS) to provide improved local and remote command and control capabilities. Additionally, RAIL performs transmitted signal analysis using a Digital Acquisition board to capture and analyze the transmitted Loran signal. A broad functional diagram is shown in Figure 1.

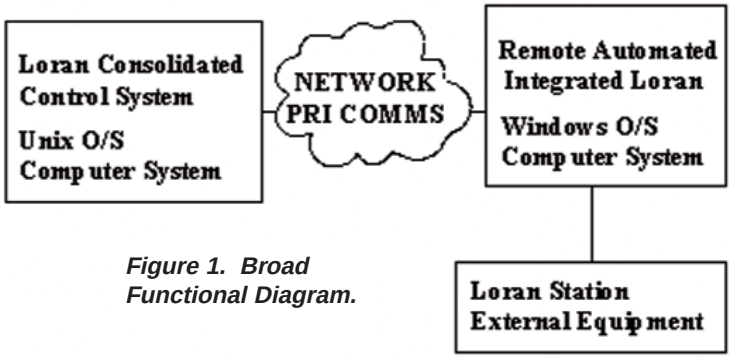


Figure 1. Broad Functional Diagram.

The data communications network is the backbone of the Loran system allowing for remote control and monitoring. The new architecture employs a Frame Relay network service with state-of-the-art routing equipment. A Cisco 2651 router is installed at each Loran station and a 3650 Cisco router is installed at each Navigation Center for their remote control computer system (LCCS).

The network incorporates point-to-point connectivity. A block diagram is shown in Figure 2. Each LCCS connects to the network through a router. The LCCS router's serial interface (S0) connects to the Wide-Area-Network (WAN) with a T1 line via the telephone company's data communication equipment (DCE/DSU). Each Loran station connects to the WAN using the station router's serial interface (S0) with a 64 Kbps line via the telephone company's DSU. The network data link layer is Frame Relay and the transport and network protocol is TCP/IP.

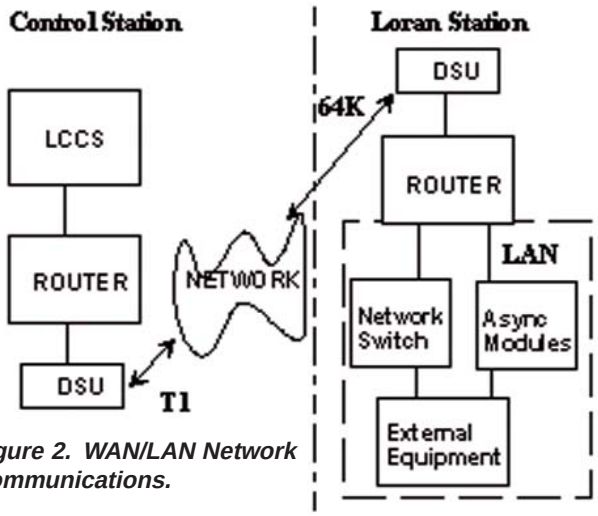


Figure 2. WAN/LAN Network Communications.

The Local-Area Network (LAN), shown in Figure 2, inside the dashed lines, includes all communications on the Loran station side of the router. All external equipment at the Loran station is connected to the LAN. A Cisco network switch and two eight-port asynchronous modules are used to allow multiple port connectivity to the LAN, and subsequently to the WAN. The two asynchronous modules are Cisco router plug-in devices. Each module allows up to eight separate RS-232 ports totaling 16 external RS-232 ports. The network switch has 16 separate Ethernet ports. Providing both Ethernet and RS-232 port connectivity ensures that all equipment connectivity requirements would be met, both now (mainly RS-232), and in the future (Ethernet).

RAIL Equipment Suite. The computer system is the Dell Poweredge 2500. This computer is a robust server with plenty of built-in fault tolerance. The chassis houses the processor, computer bus, required power supplies, expansion boards, and required backplane connections. The computer employs three front panel accessible 300-watt hot swappable power supplies, four hot swappable cooling fans, and three front panel accessible SCSI hot swappable hard disks. The processor and its sub-components reside on an active motherboard configuration.

The system also includes an 18-inch viewable color monitor and keyboard with touchpad. All equipment is installed in a standard 19-inch equipment rack.

The RAIL computer uses the Windows 2000 Pro operating system. The RAIL applications software is written in Microsoft Visual Studio Visual C++ and National Instruments Measurement Studio Lab Windows. The GUI is the centerpiece of the RAIL computer, and allows the operator at the local site to command and control the Loran station's equipment. An example of the GUI is shown in Figure 3.

CCRS EQUIPMENT. The Casualty Control Receiver Set (CCRS) is the Loran receiver and associated equipment located at a USCG Loran station. The CCRS allows Loran station technicians to monitor the timing of their transmitted signal. The CCRS locks onto every Loran signal that it can find. Every five seconds, it sends to RAIL an update of critical station data.

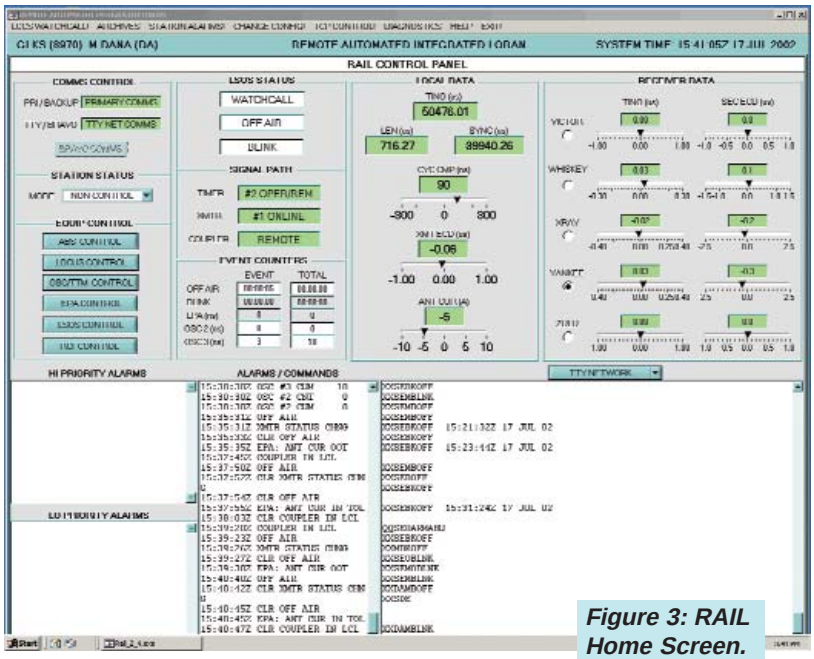


Figure 3: RAIL Home Screen.

RAIL EPA. The Electrical Pulse Analyzer (EPA) emulator, the Compuscope 1250 Digital Storage Oscilloscope manufactured by GAGE Inc., is a dual channel 50MS/s sampling rate PCI board. It was designed to replace all functions of the current EPA, the TS-3550/FPN. The RAIL EPA is a waveform digitizer data acquisition (DAQ) board that installs in the RAIL computer's PCI bus. It provides the critical Loran signal data of the transmitted Loran signal, such as Peak Volts.

The DAQ device (Figure 4) analyzes the Loran-C transmitted signal via a feedback circuit returning the local signal (Operate RF return) to the RAIL CPU. The signal is converted to a digital format that is readable by the RAIL computer. The Operate RF signal is analyzed using specific algorithms in the RAIL application software with the resulting information presented to the Loran watch stander.

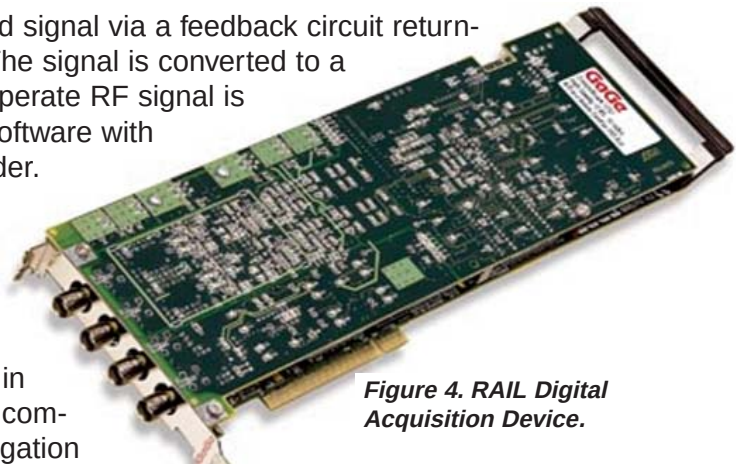


Figure 4. RAIL Digital Acquisition Device.

Summary. The Loran system now operates on a new high-speed Frame Relay data network. The local control uses a highly reliable fault tolerant state-of-the-art computer system. The signal will be monitored with one of the most advanced Loran monitor grade receivers available in the world. These improvements will enhance the Loran-C's command and control functions, as well as improve its radionavigation capabilities, keeping it the safest bet for radionavigation in the future.

These system improvements become increasingly important during periods where no local watch stander is on-site. The improved remote connection and data integrity will eventually allow for autonomous operation of the Loran station.

Secretary Ridge Congratulates the Yard

Department of Homeland Secretary Tom Ridge (left) congratulates Captain Ron Rábago, (center left), Ed Warble (center right), and Howard Galliford (right) on the Yard's receipt of the President's 2003 White House "Closing the Circle" Award.

For the second time in the Yard's history, the shipyard has received a White House "Closing the Circle" Award for achievement in environmental management and attainment of the ISO 14001 Certification. The Awards are bestowed annually to those federal agencies cited for outstanding accomplishments in and commitment to environmental stewardship. The Yard received its first "Closing the Circle" Award in 1997 for significant achievements in recycling and waste and pollution prevention.

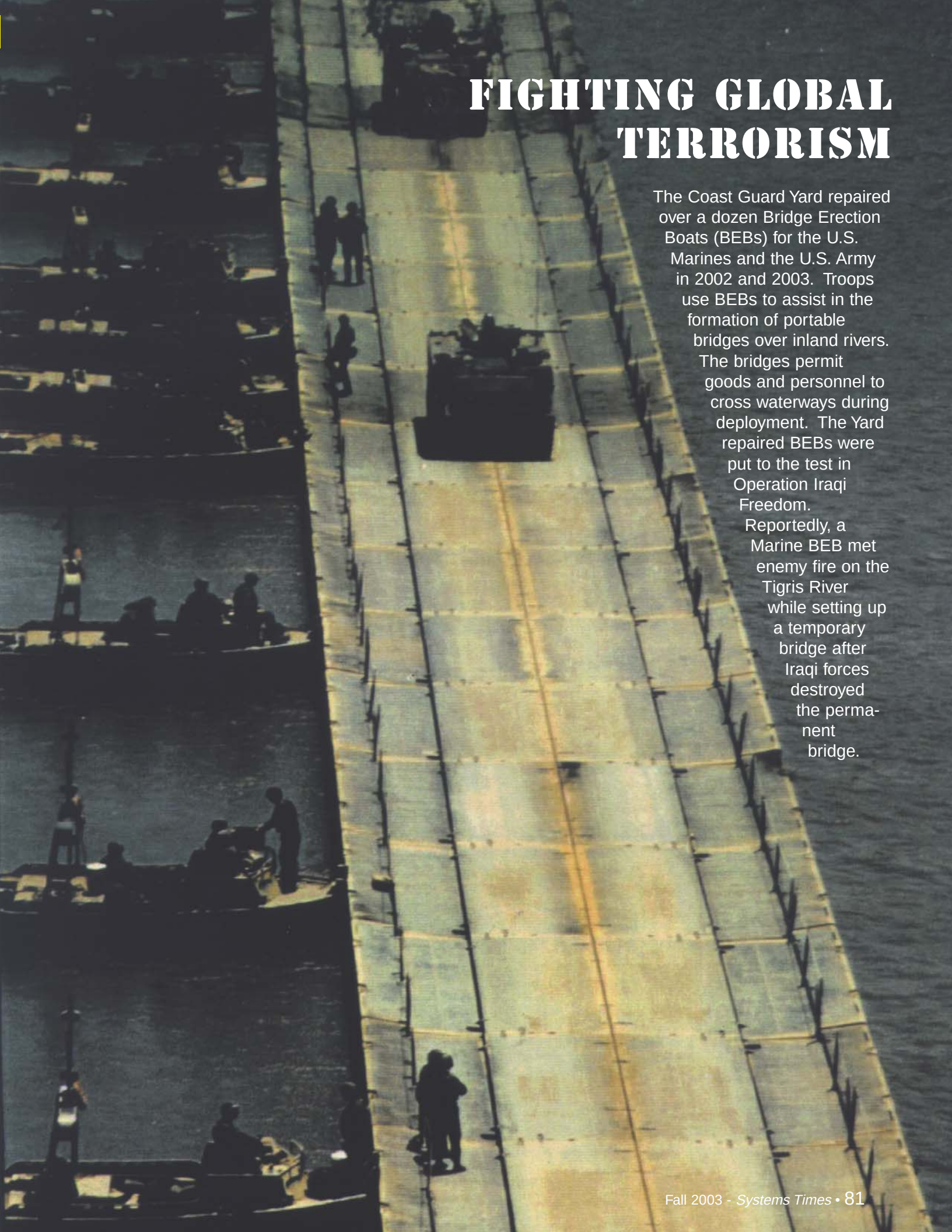
On 10 June 2003, federal employees representing 11 Departments and Agencies from across the United States gathered in Washington, D.C. to accept the prestigious "Closing the Circle" Award from John Howard, the White House Federal Environmental Executive. Competition categories included environmental management systems, education and outreach, purchase of environmentally preferable and bio-based products, sustainable design for buildings, waste and pollution prevention, and recycling.

"This year's honorees have heeded President Bush's call for the federal government to lead by example, be a good neighbor, and be a good steward of our resources," Howard said. "These outstanding programs demonstrate our federal work force is committed to improving its environmental performance and protecting our resources through such actions as establishing environmental management systems; increasing the purchase of green products and services; designing, constructing, and operating buildings using sustainable principles; and reducing the generation of wastes."

The Yard was the first organization in the U.S. Coast Guard and the first shipyard in the United States to achieve ISO 14001 certification. Attainment of this world-class pollution prevention standard insures the Yard's compliance with environmental regulations and commits the shipyard to continually improve its environmental performance.

Adherence to the ISO standard and improvements in environmental management systems have yielded greater productivity and employee safety at the Yard. For example, the Yard now uses hydro-blasting instead of abrasive grit blasting for paint removal. This eliminates airborne contaminants, allows workers to filter wastewater and process paint chips for removal, and saves time by ridding the need for grit and dust clean-up.

Captain Ron Rábago, Yard Commanding Officer and former Industrial Manager; Ed Warble, Safety & Occupational Health Manager; and Howard Galliford, Yard Environmental Engineer, traveled to Washington on the 10th to accept the "Closing the Circle" award. Following the Award Ceremony, they joined Department of Homeland Security Secretary Tom Ridge for a private reception and received additional accolades regarding the Yard's accomplishments in environmental management.



FIGHTING GLOBAL TERRORISM

The Coast Guard Yard repaired over a dozen Bridge Erection Boats (BEBs) for the U.S. Marines and the U.S. Army in 2002 and 2003. Troops use BEBs to assist in the formation of portable bridges over inland rivers. The bridges permit goods and personnel to cross waterways during deployment. The Yard repaired BEBs were put to the test in Operation Iraqi Freedom. Reportedly, a Marine BEB met enemy fire on the Tigris River while setting up a temporary bridge after Iraqi forces destroyed the permanent bridge.

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